THE BULLETIN

of the

AMERICAN ASSOCIATION

of

NURSE ANESTHETISTS

NOVEMBER

1940

VOLUME 8 NUMBER 4

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BULLETIN OF THE AMERICAN ASSOCIATION OF NURSE ANESTHETISTS

The Bulletin of the American Association of Nurse Anesthetists is published by the American Association of Nurse Anesthetists; Executive, Editorial and Business Offices, 2065 Adelbert Road, Cleveland, Ohio.

Publishing Committee: Gertrude L. Fife, Chairman; Harriet L. Aberg, Rose G. Donavan, Barbara Brown.

Entered as second class matter February 6, 1937, at the Postoffice at Cleveland, Ohio, under the Act of March 3, 1879.

Published quarterly; subscription price—members 50¢ per year; nonmembers, $1.00 per year.

EDITORIAL COMMUNICATIONS

The Bulletin invites concise, original articles on anesthesia. Description of new technics and methods are welcomed. Articles are accepted for publication with the understanding that they are contributed solely to the Bulletin of the American Association of Nurse Anesthetists.

Manuscripts submitted for publication may be sent to Gertrude L. Fife, University Hospitals, Cleveland, Ohio.

The American Association of Nurse Anesthetists does not hold itself responsible for any statements or opinions expressed by any contributor in any article published in its columns.

Manuscripts. — Manuscripts should be typewritten on one side of the paper only, with double spacing and liberal margins. References should be placed at the end of the article and should conform to the following style: viz., name of author, title of article, and name of periodical with volume, page, and year.

Illustrations accompanying manuscripts should be numbered, provided with suitable legends, and marked on margin or back with the author's name, Authors should indicate on the manuscript the approximate position of text figures.

Illustrations — A reasonable number of half-tones will be reproduced free of cost to the author, but special arrangements must be made with the Chairman of the Publishing Committee for elaborate tables or extra illustrations.

Reprints. — Fifty or more reprints may be obtained at a nominal cost if ordered within fifteen days following the date of publication of the Bulletin.

BUSINESS COMMUNICATIONS

All communications in regard to advertising, subscriptions, change of address, et cetera, should be addressed to the Chairman of the Publishing Committee, 2065 Adelbert Road, Cleveland, Ohio.

The Chairman of the Publishing Committee should be advised of change of address about fifteen days before the date of issue, with both old and new addresses given.

Because of the second class postal rates in effect the Postoffice does not forward the Bulletin unless extra postage is sent to the Postoffice to which the Bulletin was originally mailed.

Non-Receipt of Copies. — Complaints of non-receipt of copies should be made within ten days following date of publication, otherwise the supply is likely to be exhausted.

The Bulletin of the American Association of Nurse Anesthetists

VOLUME 8, NO. 4 NOVEMBER, 1940

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HELEN LAMB, President

REPORT OF PRESIDENT

Once again it is my privilege at this, our eighth annual meeting, to review and report to you the activities and progress of the Association. The meeting here in Boston is of special significance to this group, for Boston is associated with the beginning of the era of modern anesthesia.

During this year the growth of the organization numerically has measured up to that of past years, but we cannot hope for a continuance of this number of new members each year. The older anesthetists who are eligible for membership will eventually be absorbed into the organization, and accession of new members eventually will be primarily from among the recent graduates from the schools of anesthesia. In this connection, those of our members who function on the Membership Committees in the organized states and have encountered problem applicants from among the older group, should find that this problem will adjust itself automatically with the necessarily diminishing number of this type of applicant.

Many organization problems have been eliminated or minimized during this past year as the result of the adoption at Toronto of the new set of By-Laws, but progress and change being synonymous, a few revisions will be proposed again this year by the Revisions Committee, which changes are considered to be for the best interests of the Association.

With the stabilizing of the functions of the organization itself, the issues upon which the future of the organization and the worth of the nurse anesthetist in the field of medicine largely depend, now come to focus around the educational advancement program.

Because of the nature of growth, each profession, like personalities, must always pass through a long, and sometimes painful period of development. The history of the medical profession and of the nursing profession bears witness to this, but because this organization began its career at a much later time, we have the advantage of, and should profit by, knowledge gained by the other professions in their process of development. It is interesting to note that in the profession of nursing today, with its state laws, state accrediting of schools and Boards of Licensure, that a definite need is still felt, and that a program has been started by the National League of Nursing Education for national accrediting of schools of nursing by this body. This project is the result of many years' experience in the development of educational programs. This should encourage us and give us confidence that we are pursuing the right course in working toward a national accreditation of the schools of anesthesia through the American Association of Nurse Anesthetists, but this in my opinion is not our logical next step.

A brief review of the tangible, concrete evidence of the progress made in the development of our educational program shows us at present an adopted curriculum which, I believe, the majority, if not all, of the schools are now using as a basis for their courses in anesthesia. We know that all schools on the list of the American Association of Nurse Anesthetists are now giving at least the minimum six months' course. Graduation from a six months' course was set last year by the Association in Toronto as a minimum requirement for immediate eligibility to active membership. At this time last year, there was but one school remaining on our list that had not increased the length of

course to at least six months, and there are a number of schools which, during these years that the organization has been functioning, have increased their courses beyond the minimum to eight or nine months or a year. The school just mentioned, giving a four months' course, was immediately notified of the change in the eligibility clause and within two months the director of this school had increased the course to six months. We know, of course, that the efficiency of the graduates of schools of anesthesia is determined not only by the length of time spent in the school, but by the didactic teaching, the practical instruction and experience, and the abilities of those upon whom this responsibility rests.

The questionnaire mailed to schools during last year and to which we had practically 100 per cent response, furnished the Association with certain factual knowledge concerning each school, but it is understandable that the appraisal of a school cannot be based on knowledge gained by this method alone. The next step in the educational program toward ultimate accreditation or approval of schools, therefore, is a personal visitation project.

This preliminary program of visitation of schools or fact-finding survey, has been approved by the Board of Trustees during the past year, and the Educational Committee, in conjunction with the Board of Trustees, has virtually completed the details of handling the survey, including a comprehensive questionnaire on all phases of set-up of the school, for the use of the member visitors. This first survey is to make use of member visitors, selecting wherever possible those concerned with the training of the nurse anesthetist. By using the teachers in the field, the advantage to the schools visited and likewise to the member visitors is, of course, apparent.

After this first personal survey is completed, the evaluation of the findings by the Correlating and Educational Committees will lead unquestionably to a reappraisal of the curriculum and a hoped for re-evaluation of minimum requirements on time basis. The basic requirements for accreditation of schools should also be possible of formulation as a result of this survey.

This survey is by no means a compulsory act on the part of the American Association of Nurse Anesthetists; the schools are being invited to participate in this program.

It is with keen regret that I find it necessary to report at this meeting that the plans for the survey only are completed, and that I am not able to report the results of the survey. However, considering the time element in our advancement program, we should not become impatient and lose sight of the fact that with the exception of the staff of two at Headquarters and a rare exception among our membership, the individuals engaged in carrying forward the program of this organization are holding full time positions, frequently positions of great responsibility.

The accreditation or approval of schools implies a visit to the school for this purpose and periodic visits to insure continuance of standards set for the accredited or approved list. It is possible that this project might be carried forward continuing to use member visitors in the localities of the schools, but it is more logical to suppose that continued appraisal of schools can be carried out more accurately, fairly and efficiently by one or several people especially selected and trained. Also it would seem more logical to suppose that the needs of the schools could be evaluated more nearly and more helpful, con-

structive assistance be made available to the schools by such a method of approach. But additional staff personnel for this purpose is not possible without additional revenue, and I shall explain later a means of obtaining it.

We know that the schools at present are not all offering equal minimum opportunities to their students, and this will continue to remain so until an accrediting or program of approval has been put into effect. But until such time as the organization is assured of a uniformity, within limits, of qualifications, an additional check on the applicant's qualifications for membership in the American Association of Nurse Anesthetists beyond the minimum requirements based on length of course, can be made by instituting examinations for applicants. Such a plan does not originate with me, but was advocated in 1934 by Gertrude Fife, then President. Nevertheless it is my considered opinion that we have now arrived at that period in our development when this project can and should be put into effect in order to insure to the members of the American Association of Nurse Anesthetists and to those who are employing nurse anesthetists, that we are admitting properly qualified people only.

The instituting of examination of the individual applicant would mean that the applicant for membership must first meet the minimum educational requirements and in addition pass the examination set by the National Examining Board of the American Association of Nurse Anesthetists.

These examinations would be an additional spur to the schools of anesthesia concerning their teaching program, and the examinations will also be a further check on the caliber of the school by the continuing per cent of successful candidates or failures from the various schools.

No program for admittance to membership and of registration by examination of the individual should, of course, be retroactive. All active members in good standing in the organization at the time such a program went into effect should be allowed the privilege of becoming registered under a waiver by payment of the registration fee during a definite time to be agreed upon. All members failing to take advantage of registration under the waiver should be obliged to take and successfully pass the same examination given to new applicants, in order to become again a member of the American Association of Nurse Anesthetists.

The additional revenue from applicants' and waiver fees would give the needed monies spoken of previously for a full time field worker, which need appears to be a rather vital one as a means of help in standardization and elevation of the standards of the teaching centers.

We, as an organization, need the cooperation of the schools of anesthesia and we sincerely hope for the continuance of the same cooperation that has been shown in the past by the schools in the development of our educational program. It is important that we encourage the now existing schools to continue to function and to increase their standards of training in accordance with the increasing standards set by the organization for eligibility of membership.

There is a very apparent and real need for more well trained nurse anesthetists. I have had numerous letters and telegrams, asking for help in finding anesthetists. These have come from superintendents of hospitals and placement bureaus, and the schools I know are having far more requests for anesthetists than they can fill.

The Seal Committee has gone adventuring this year and the interesting illustrated story of their quest I shall leave for their telling, but the design chosen here today will be the official seal and emblem of this organization and the design to be used upon the organization pin. It would seem that such a pin to be of significance and value should carry upon its face the word "Registered." If the plans suggested are carried out, no organization pin will be available to the members until the examination program (or some other means of registering the members) is put into effect.

The Educational Department in the Bulletin was officially started with the May issue, which carried an introductory article on this department by Agatha Hodgins. This was followed in the August issue by the first scientific article, written by Helen Lamb, Chairman of the Educational Correlating Committee. The purpose of this new department was covered thoroughly in the article of introduction and therefore needs no elaboration here.

The Publishing Committee has this year continued to serve faithfully and well. Many favorable comments have been received on this year's issues both as to content and editorial set-up, but it is still true and I shall state again, that we have not exhausted the possibilities of the Bulletin in benefits to the members. Among 2000 members, there should be a wealth of ideas for further extension and growth of our publication.

During the first part of the year, a special Questionnaire Committee was occupied with the details of compiling a questionnaire on anesthesia service, to be sent to all registered hospitals. Before the details of this project were completed, the Council on Medical Education and Hospitals of the American Medical Association published the report of findings on questions relative to anesthesia service, incorporated in the 1939 annual census of hospitals information blank. The additional information sought by our association aside from that available to us in this report (facts heretofore unknown) did not at this time seem to warrant the expense of a survey of our own, the cost of which would be considerable, as there are 6226 registered hospitals in the United States. This project was therefore laid aside for the year. The report on Anesthesia Service referred to will be found in the Journal of the American Medical Association, page 1260 of the March 30, 1940 issue.

You, of course, are all familiar with the intercoupler developed by Dr. Horton. Further research on the elimination of explosive hazards is being carried on at the Massachusetts Institute of Technology by Dr. Horton and his coworkers. Three problems are being studied:

1. Elimination of static in the operating room.
2. The development of a flame and pulse barrier to isolate the patient from an explosion occurring in the machine.
3. Mixture of various gases to limit the explosive range to percentage limits outside the anesthesia range.

The continuance of this research to date has been made possible by contributions from the American Hospital Association, the New England Hospital Association and the American Society of Anesthetists. A joint committee was formed from the various organizations to which this problem is important, and the American Association of Nurse Anesthetists was invited to have representation on this committee. The appointment was approved by the Board of Trustees of the American Association of Nurse Anesthetists, who also re-

cently approved a contribution from the Association of $300 to assist in carrying on this research.

This year we have seen the organization of the states of Louisiana, Iowa and New Jersey, and the organization of the Tri-State Nurse Anesthetists' Assembly and the Mid-Western Nurse Anesthetists' Assembly. It was my privilege to be present at the organization meeting of the Mid-Western Assembly in Kansas City.

Many worth while programs were put on this year by the state associations and the group assemblies. With the number of the state and sectional assemblies now organized, virtually every member, when distance prohibits attendance at the national annual meeting, now has the advantage and opportunity of group contacts in such sectional meeting.

The newly created Executive Committee held two meetings in Chicago during the year; no general Board meeting was held.

In conclusion, may I recommend that immediately following this Convention, a special committee be appointed to work out in detail the plan for national examination for applicants to membership, these plans to be ready for presentation and consideration by the membership at the 1941 meeting. I fully appreciate that neither the task of setting up the machinery for this project nor the carrying out of it is a task of small magnitude. But there have always been, and I am sure will continue to be, those in our organization who are willing to give generously of their time and personal effort for the building of this organization.

My term of service as your President is about to end and my feeling at the present time might be compared to that of one who had been given a young child to care for over a period of time. Having looked after it, worried and occasionally lost sleep over it during the many indispositions of adolescence, but always having the child's interest at heart, I naturally became very fond of the youngster and am experiencing a feeling of real loss at this time of its departure. The one consolation is, however, that I am confident that it will "wax strong in spirit" under the guidance of its next foster parent.

I am truly grateful for the opportunity which I have had to serve the Association during these years as your President. The long, arduous hours required of this office, and the many denials necessary to meet the demands on time required by association activities are in retrospect but small compared to the gain.

I wish to express my deepest appreciation to all those who have served faithfully and well during my administration. To the Officers, Board of Trustees and Committees I offer my sincere thanks for their loyal cooperation. The many pleasant contacts, and the friendships formed will always make these years unforgettable ones.

We are living in the midst of troubled and doubtful times, and we know not what the future holds for us either as individuals or as an organization, but let us pursue our course, as individuals and as an organization, following the belief of that wise philosopher, Ralph Waldo Emerson, who said, "Work and learn—there is but only one liberator in this life, and that is ENDEAVOR, earnest, entire, perennial Endeavor."

MIRIAM G. SHUPP

September, 1940

REPORT OF EXECUTIVE SECRETARY

Immediately following the annual meeting in Toronto in 1939, the necessary papers for the dissolution of the incorporation of the National Association of Nurse Anesthetists under the law of the state of Ohio were sent to Earl Griffith, Secretary of State of Ohio, and application for the incorporation of the American Association of Nurse Anesthetists under the law of the State of Illinois was sent to Edward Hughes, Secretary of State of Illinois.

On October 8, 1939, a Certificate of Dissolution was received from the Secretary of State of Ohio and on October 19, 1939, Certificate of Incorporation of the American Association of Nurse Anesthetists was received from the Secretary of State of Illinois. To comply with the law of the state of Illinois, the Certificate of Incorporation was recorded in the office of the County Recorder, Chicago, Illinois.

On October 19, 1939, a copy of the resolution adopted at the annual meeting held in Toronto, regarding the giving of anesthetics and demonstration of anesthesia technique by members of the American Association of Nurse Anesthetists in hospitals other than their own, was sent to the President of each State Association, in compliance with the stipulation in the resolution.

On October 19, 1939, a copy of the resolution regarding the revision of the By-Laws of the State Associations, adopted at the annual meeting held in Toronto, was sent to the Secretaries of the State Associations.

On November 27, 1939, a copy of suggested form of State Constitution and By-Laws was sent to the President and Secretary of each state association, requesting the states to revise their By-Laws in accordance with same. Follow-up letters were sent to five states; all states responded except one. Copies of by-laws received were promptly forwarded to the Revisions Committee for their consideration. All states were requested to send a final corrected copy of their By-Laws incorporating the suggestions and recommendations from the Revisions Committee, for the files at Headquarters. Thirteen states have responded to this request.

I would like at this time to express my appreciation to the Revisions Committee for their splendid cooperation and to commend them for the excellent work accomplished during the past year, for it must have meant much time and effort.

In January, 1940, a form letter requesting suggested names of nominees for the ballot for the 1940 convention was sent to the President and Secretary of each state association, to be submitted to Miss Dorothy Hoadley, Chairman of the Nominating Committee.

A notice asking the members of the American Association of Nurse Anesthetists for suggestions and contributions to the program of the annual meeting to be held in Boston, was published in the February issue of the Bulletin. No responses to the notice were received.

Although it was voted unanimously at the annual meeting in Toronto that the American Association of Nurse Anesthetists have an Educational Booth at the annual convention in Boston, this exhibit was dispensed with this year due to the inability to secure some one to assume the responsibility as Chairman of the Educational Exhibit Committee. Inasmuch as we have so many

splendid leaders in the educational field, before we leave this convention may we have volunteers to sponsor a worth while Educational Exhibit at our next annual convention in Atlantic City in 1941. May I quote from the remarks of Mr. Robert E. Neff, Iowa, President of the American Hospital Association in 1938, published in one of the daily Bulletins of the American Hospital Association at the convention in Dallas—"After all the final responsibility lies not with those charged with the organization, but with our membership, who, by their opinions, formulate the policies which influence not only the American Hospital Association, but the entire hospital field."

Upon request of Helen Lamb, Chairman of the Education and Educational Correlating Committees, a letter was sent August 15 to the Chief Anesthetists of thirty-five Schools of Anesthesia conducted by nurse anesthetists, asking them to submit suggestions or problems for discussion at the Instructors' Session to be held during the annual convention.

On August 20, a letter was sent to the President of each state association reminding them of the meeting of the Advisory Council and requesting the name of the member to represent her at this meeting in the event she could not attend.

During the past year requests for affiliate membership with the American Association of Nurse Anesthetists were received from the following states: Arkansas, Iowa, Kansas, Louisiana, Massachusetts and New Jersey. Louisiana, New Jersey and Massachusetts have been added to the organized states this year. Practically all requirements, with the exception of a few details, have been met by the other three states seeking affiliation.

In January, 1940, a letter was received from Miss Marjorie Gentle, former Secretary of the Hawaii Association, stating that Hawaii was no longer functioning as a territorial association.

The total paid-up membership of the American Association of Nurse Anesthetists, September 1, 1940, is as follows:

Active	2090	
Associate	88	
Total		2178

This is an increase of 271 as compared to 1939.

PAID-UP MEMBERSHIP:

Organized states:

Active	1726	
Associate	65	
Total		1791

Unorganized states:

Active	364	
Associate	23	
Total		387

DELINQUENT MEMBERS—1939

Organized states	113	
Unorganized states	30	
Total		143
Resignations	20	
Deceased	3	

NEW MEMBERS ACCEPTED:

Active	392	
Associate	6	
Total		398
Organized states	315	
Unorganized states	83	

Following is a brief summary of the correspondence and activities at Headquarters:

Requests for list of schools and other information	589
Request for anesthetists	52
Requests for positions.....	14
Changes of address	534
Transfers from one state to another.....	265

It would be impossible in this brief report to classify and enumerate the many varied types of correspondence received at Headquarters. During the past year approximately 3850 pieces of mail were received with 4135 enclosures, and the mail sent out totalled 5950 pieces, with 7659 enclosures.

As the various committee reports are read you will hear the details of the projects now being carried forward, consequently no attempt is made to discuss any of these activities in this report.

The Executive Secretary wishes to express to the officers, members of the Board of Trustees, chairmen of the committees, secretaries of the state associations, and all the members, her deep appreciation of their splendid cooperation and support during the past year.

Respectfully submitted.

ANNA WILLENBORG,

September 17, 1940

REPORT OF TREASURER

September 1, 1939 to August 31, 1940 inclusive

Cash in Bank August 31, 1939		$9170.14
Receipts — September 1, 1939, to August 31, 1940, inclusive		
Initiation fees	$ 823.00	
Dues — American Association	7432.20	
— State Associations	1072.00	
For Pins	10.00	
Reserved for Trust Fund	225.40	
Reserved for Publishing Fund	1173.50	
Income Sales Advertising	1325.00	
Registration fees — convention	131.00	
Bank Interest	59.05	
Gift from Missouri Association	50.00	
Miscellaneous Income	1.75	12302.90
		$21473.04
Disbursements — September 1, 1939, to August 31, 1940		
Six (6) $1000 U.S. Saving Bonds	$ 4500.00	
Contribution to American Hospital Ass'n	720.00	
Contribution to Joint Committee on Anesthesia Hazards — Dr. Wilmer Allen, Chairman	300.00	
Salary Executive Secretary	3000.00	
Accounting Service	50.00	
Stenographic Service	1499.67	
Postage	453.98	
Office Equipment	45.35	
Office Supplies and Printing	308.83	
Telephone and Telegraph	111.00	
Traveling Expense	299.93	
Convention Expense	916.84	
Services of Parliamentarian	25.45	
Incorporation Expense	41.56	
Publishing Bulletin	2566.01	
Books and Periodicals	11.75	
Refund of dues	3.25	
Refund of fees	8.00	
Transfers to State Associations	283.75	
Transfers to Trust Fund	225.40	
Miscellaneous Expense	62.44	15433.21
Cash In Bank August 31, 1940		$6039.83
Consisting of the following:		
General Savings Account No. 106581, Cleveland Trust Company	$4396.74	
General Savings Account No. 102794, National City Bank	6.65	

General Savings Account No. D16133, Central National Bank	1529.47	
Commercial account, Cleveland Trust Company	106.97	$6039.83

TRUST FUND

Cash in Bank September 1, 1939	$557.10	
Receipts		
Total amount reserved for Trust Fund accumulated September 1, 1939, to August 31, 1940, and transferred from General Account of the American Association of Nurse Anesthetists to Trust Fund	225.40	
Interest earned over same period,	5.28	
	$787.78	
Disbursements		
Interest earned during year transferred to Trust Fund Income Savings Account No. 110398	5.28	
Cash in Bank September 1, 1940		$782.50

TRUST FUND INCOME

Cash in Bank September 1, 1939	$ 10.38	
Receipts		
Transfer of interest earnings from Trust Fund Savings Account No. 110399 to Savings Account No. 110398	5.28	
Cash in Bank, September 1, 1940		$ 15.66

SUMMARY OF ASSETS

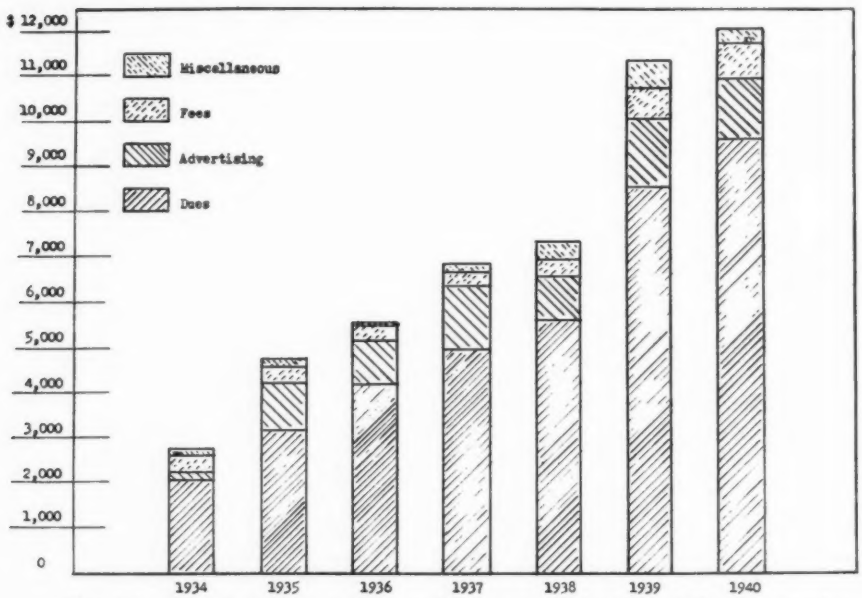
Cash on deposit in general savings accounts	$ 5932.86
Cash in commercial account	106.97
Cash on deposit in Trust Fund savings account	782.50
Cash on deposit in Trust Fund Income savings account	15.66
Six (6) United States Government Postal Savings Bonds (par value at maturity $6000.00)	4500.00
TOTAL ASSETS	$11,337.99

Respectfully submitted,
Gertrude L. Fife

September, 1940

Treasurer's Report (continued)

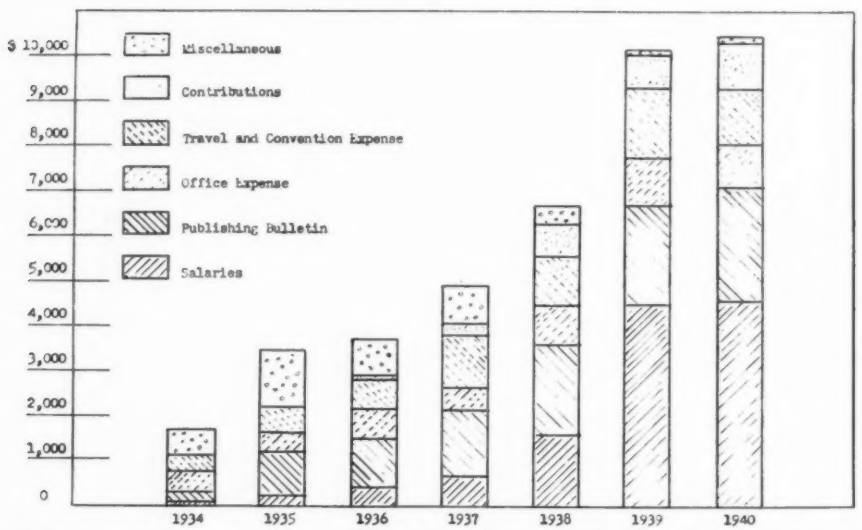
RECEIPTS



Receipts—The increases in fees and dues are indicative of the progressive, normal growth of the organization. From 1939 on, part of this increase is due to the advance in fees and dues.

When the organization was moved from Cleveland to Chicago the reserve fund accumulated during the years from 1931 to 1937 amounted to $7826.68.

DISBURSEMENTS



Disbursements—In 1934-35-36-37, legal fees are included in Miscellaneous Expense, as it was impossible to show in detail every item of expenditure.

Contributions cover payment to the American Hospital Association, which organization allows us space for national headquarters.

The headquarters was moved to Chicago the last part of 1937. Before that time a part-time office secretary only was employed. A full-time office secretary was employed in November, 1937, and in July, 1938, a full-time paid Executive Secretary.

The cost of publishing the Bulletin has increased because of the added number of copies and the increase in the number of pages printed.

CERTIFICATE OF AUDIT

"I examined the Minutes of the meetings of the Board of Trustees and found that all action taken by the Board relative to financial matters has been properly reflected in the books of account.

"The Treasurer's records are neatly and accurately maintained in accordance with accepted bookkeeping methods and all monies received have been properly accounted for.

"I have examined the books and records of the Treasurer's Office of The American Association of Nurse Anesthetists and I hereby certify that in my opinion the statements accompanying this report correctly reflect the financial transactions for the year ended August 31, 1940, and the balances on deposit in the various bank accounts at that date."

(signed) Charles H. Pimlott

REPORT OF THE COMMITTEE ON EDUCATION

During the year just closed, our committee activities have centered around development of a comprehensive plan, looking to the ultimate evaluation of listed schools throughout the country which educate nurse anesthetists.

One of the first steps worked out in this connection, consists of a detailed plan, under which each of these schools would be visited by selected members of our Association, for the purpose of obtaining specific first-hand knowledge of the educational facilities, as related to the education afforded to its student nurse anesthetists.

Obviously, the accomplishment of a project of such consequence, with minimum expense of time, effort and funds, requires careful planning of each of the individual steps before the plan as a whole is set in motion. Illustrative of the progress which has been made to date, your committee reports:

FIRST: in the interest of maximum efficiency in executing the schools visit plan, charting into 11 geographical zones the 42 schools of training for nurse anesthetists which exist throughout the country.

SECOND: to promote effective and economical inspection, selection of a tentative inspection personnel of 23 qualified members to visit assigned schools which are located near to them.

THIRD: to establish uniform contacts between indicated hospital directors, school officials and assigned member visitors, compilation of a standard set of

correspondence explanatory of the object and purpose of the survey; which is now ready for use in the execution of the project.

FOURTH: to insure a just appraisal of the listed schools, a comprehensive questionnaire covering the information required, is in the process of compilation. The major part of this questionnaire is finished; the entire document will be completed within a short time.

Your committee feels, however, that before the project is put into effect, not only should the questionnaire itself be completed and sanctioned, but that every integral part of the plan should be worked out in detail, and coordination of the whole project put on a practical working basis.

This complete direction of effort is particularly indicated in consideration of the benefits that will accrue to the future educational program of the American Association of Nurse Anesthetists as a result of acquiring such a wealth of instructive information.

It is also the hope of this committee that the completed and tabulated questionnaire material will prove of value in any plan which the American Association of Nurse Anesthetists may be called upon to assist with relative to the wide scale impending National Defense Training Program.

Your committee reports with appreciative interest, participation in judging the merits of technical papers on anesthesia, which were submitted by nurse anesthetist students of the Schools of Anesthesia conducted at Jewish Hospital, Philadelphia, and Mercy Hospital, Pittsburgh. The papers entered in this contest, which was conducted under the auspices of the Pennsylvania Association of Nurse Anesthetists, for the prize offered by Miss Hilda Salomon, evidence the excellence of preparation given the students. The prize winning papers showed distinct ability in presentation of the chosen subjects. It is hoped that similar competitions may bring to our committee participation in other like stimulating experiences. It is our belief that one of the worth while results of the planned school inspection survey will be the encouragement of fullest personal interchange between schools personnel and their State organizations as well as between schools personnel and our Association.

Our committee desires to express its appreciation of the helpful cooperation of the officers and Board of Trustees of our Association, whose assistance, always generously available, has contributed much to the progress of our committee during the year.

Respectfully submitted,

Hazel Blanchard
Sister Rudolpha
Agatha Hodgins
Helen Lamb, Chairman

September, 1940.

REPORT OF CURRICULUM COMMITTEE 1940

The Curriculum Committee was created at the 1939 meeting in Toronto, Canada, as a subdivision of the Educational Committee, the Chairman of this committee being by reason of her office a member of the Correlating Committee.

The policy of the Curriculum Committee is to make the present revision a guide to all Schools of Anesthesia without interfering with the respective hospital educational programs.

The purpose of this committee has been to collect and evaluate data and present in concise form a curriculum that is in keeping with progressive educational methods. The object of this recommended program of study is to serve as a guide from which each School of Anesthesia may work out its own curriculum.

The best of the old curriculum has been retained and new subjects and methods have been incorporated which appeared to be in keeping with the progress since made in educational and scientific knowledge. While the scope of some subjects has been widened, that of others has been narrowed. Those subjects that have been treated at greater length are: physiology, anatomy, gas therapy, and permanent records, and those that have been given less space are the less used anesthetic drugs, and specific equipment for departments.

It is intended that the entire curriculum be so elastically constructed that changes may be made as needed by the individual school without defeating its objectives. Unquestionably these objectives are to graduate nurse anesthetists who are not only skilled in the art of the administration of anesthetic drugs, but also trained to know and make the practical application of theory so that they may intelligently interpret and treat all types of situations occurring before, during and after the administration of an anesthetic. Likewise the school aims to prepare the student to make the best possible adjustment in the environment in which she may be placed.

The more important additions that have been made to the curriculum are as follows:

1. An outline of methods of teaching
2. An outline of sequence of subjects, and the division into subheads of these subjects
3. Addition of chemistry and physics to the curriculum
4. Addition of journals and revised and new editions of books to the technical library
5. Historical development of anesthesiology

In submitting this report, the Curriculum Committee recognizes the fact that the order of division of subjects into study units will vary with the established routine of the particular school; also that the amount of practical experience in the administration of anesthetics afforded the student will depend on the clinical facilities of schools and the anesthetics in majority use. The teaching sequence as given in the curriculum is therefore not to be taken as in any way arbitrary but rather as suggestive.

It is also recognized that the arrangement of the curricular studies is constantly sensitive to increasing knowledge of the subjects taught; therefore,

any curriculum submitted should be flexible in regard to meeting progressive methods of teaching and should incorporate into its own content such formative knowledge as future research in anesthesiology develops.

The curriculum as revised by this committee has been submitted in its entirety to the Board of Trustees for consideration.

MARY MULLER
ESTHER MEYERS
MABEL COURTNEY
ROSALIE MCDONALD, *Chairman*

REPORT OF CORRELATING COMMITTEE

During its first year of existence, the Correlating Committee has set up the Department of Education in our Bulletin which was earlier authorized by the Board of Trustees.

Beginning with the inaugural article by Miss Hodgins which appeared in the May 1940 issue, a series has been planned to appear continuously in each succeeding issue. These articles will be individual in character, but will aim to follow the broad objectives so ably outlined by Miss Hodgins in the May issue.

The beginning of this new educational department marks a milestone in the history of the educational work of the American Association of Nurse Anesthetists. Your committee feels that the future importance of this department as a medium of exchange of educational problems, between student educators and committees of the Association, can hardly now be fully estimated.

It is the sincere hope of this committee, under whose direction the department is placed, that the contributors will be representative of a cross section of the educators in our field, and that each succeeding contribution to its columns will be of increasing value to the vital educational life of our Association.

Respectfully submitted,
Rosalie McDonald
Helen Lamb, Chairman

REPORT OF LEGISLATIVE COMMITTEE

This committee during the past year has been quiescent, there having been no developments pertaining to legislation.

The committee has done considerable work on the questionnaire which was to have been sent to all hospitals in the United States. The letter and questionnaire were completed and sent to the Board of Trustees for approval.

However, in view of the fact that our Educational Committee is preparing an extensive and detailed survey, we believe that all information desired can be secured through the Educational Committee's survey. Therefore we feel that the project submitted to the Board by the Questionnaire Committee should be dispensed with at this time.

At last year's convention your Chairman asked financial support from the various States for the pursuit of the survey as outlined to the Board and a similar request was published in the Bulletin. We now ask that all support be given to the Educational Committee.

Respectfully submitted,

MARY J. R. STEVENSON
HATTIE VICKERS
HAZEL PETERSON
HILDA R. SALOMON, *Chairman*

August 27, 1940

REPORT OF PUBLISHING COMMITTEE

FINANCIAL STATEMENT

Surplus in Publishing Fund, August 31, 1939		$1072.23
Publishing Fund accumulated September 1, 1939, to August 31, 1940, (subscription price of Bulletin — 50¢, deducted from dues of each individual member, plus sale of Bulletins to non-members)	$1173.50	
Income from Sale of Advertising, September 1, 1939, to August 31, 1940	1365.00	
		$2538.50
Total Cost of Publishing Bulletin, including postage, for year ended August 31, 1940 (total cost of publishing membership list in August, 1940, issue $232.50)		2566.01
SURPLUS, August 31, 1940		$1044.72

COMPARATIVE STATISTICAL REPORT FOR YEARS 1937-1940 INCLUSIVE:

	No. of pages exclusive of advertising	*No. of copies Distributed*	*Advertising pages*
1937	206	6400	28
1938	232	7075	29
1939	274	8600	30
1940	297	9500	30

Respectfully submitted,

HARRIET L. ABERG
ROSE G. DONAVAN
JEWELLE C. FINK
GERTRUDE L. FIFE, *Chairman*

September 10, 1940

REPORT OF REVISIONS COMMITTEE

The Revisions Committee of the American Association of Nurse Ansethetists received for their consideration during the past year the proposed Constitution and By-Laws from the following State Associations:

Alabama	Louisiana	Oklahoma
Arkansas	Massachusetts	Oregon
California	Michigan	Pennsylvania
Colorado	Minnesota	Tennessee
Florida	Missouri	Texas
Georgia	Nebraska	Virginia
Illinois	New Jersey	Washington
Indiana	New York	Wisconsin
Iowa	Ohio	

The majority of the State Associations followed the suggested form of Constitution and By-Laws, with only a few minor suggestions from this committee, with the exception of:

Alabama
Minnesota
Missouri
Nebraska
New York

Several proposed changes in Articles V and X of the present By-Laws of the American Association of Nurse Anesthetists are being submitted at this meeting.

Cora McKay
S. Louise FitzGerald
Ruth Botsford, Chairman

September, 1940

(For amendments as adopted see page 264).

1941 CONVENTION, ATLANTIC CITY, N. J.

DESIGN FOR SEAL AND PIN CHOSEN AT ANNUAL MEETING

Representing the joint efforts of the following:

W. W. Bowen, M.D., Fort Dodge, Iowa
Lennie B. Dearing, Flagstaff, Ariz.
Louise Schwarting, Fort Dodge, Iowa
Hugh C. Mosher, Phoenix, Ariz. (artist)

"Watchful care of the sleeper given by the light of the Lamp of Learning." Hypnos, the God of Sleep, lies in profound slumber on a ledge in the Cave of Night, still holding a bunch of poppies in his hand. Morpheus, the God of Dreams, has been delegated to watch over Hypnos as he sleeps, to fend off harm and insure pleasant dreams.

REPORT OF SEAL COMMITTEE

It will be recalled that at the annual convention last year in Toronto it was voted to re-incorporate the Association with a slight change in the name. At a subsequent meeting of the Board of trustees the fact was brought out that thus far the Association had no corporate seal and that it was a proper time to consider a design for one. It was suggested that the proposed seal have beauty simply as a design; that it be symbolic of our work and purpose; that it be used on the cover of our Bulletin and on the letter-heads; and that it lend itself for use as a pin. It was also suggested that the pin be made of some fine material and of good workmanship.

The matter was referred to a committee, and in order that each member of the Association might have the opportunity to contribute designs, or ideas for designs, a call was sent out through the Bulletin. An interesting fact was observed in the responses received—almost without exception the designs were apparently drawn with the pin in mind, and in only two instances was the adaptation made to the seal.

Through Mrs. Fife's helpfulness in making available to us the facilities of the University with which she is connected, lantern slides have been made of practically all drawings received and will be shown during this report so that each one present may vote for her selection. We propose to show all slides once with running comment where such is enlightening, and during the second showing you are asked to applaud your choice as perhaps the quickest way of voting. Should the volume of applause seem nearly equal in some instances, selection will be verified by a standing vote. After the first showing comment will be invited from those present.

Conferences with die makers have brought out the following points: The same design may properly be used for all our purposes. A die only need be made for the seal and pin, at a cost depending somewhat upon the design chosen; the decoration for the Bulletin cover and the letterheads can be made satisfactorily by the printers from the half-tone used for the seal.

This committee wishes to thank Mrs. Mae B. Cameron, Miss Evelyn Prock, Mrs. Flora M. Burg, Sister Mary Eulalia McGivern, Miss Agatha Hodgins, Miss Irene Arns and Miss Betty C. Brown for their cooperation in sending in designs or ideas for designs. One of the designs represents the joint effort of four people: Dr. W. W. Bowen, Dean of the medical group at Fort Dodge, Iowa, and Mrs. Lennie Dearing, one of our members at Flagstaff, Ariz. The artist who executed the design, Mr. Hugh Mosher of Phoenix, Ariz., was very helpful in selecting or rejecting bits of Greek mythology gathered by your chairman in a search through the Phoenix Library.

The artist requested a concise statement of our purpose or function and what we wished to symbolize in the design. This was expressed as "Watchful care of the sleeper given by the light of the Lamp of Learning." The figures selected are Hypnos, the God of Sleep, described as a half grown boy, lying in profound slumber on his ledge in the Cave of Night to which he retired to rest. His arm has fallen off the ledge but he still holds a bunch of poppies in his hand. Morpheus, the God of Dreams, was delegated to watch over him while he slept to fend off harm and insure pleasant dreams.

We all acknowledge happily that this organization owes much to Miss Hodgins' enthusiasm, which lead to its founding, and we remember this with deepest gratitude. Having done much, she is further endearing herself to us and placing us further in her debt by presenting us with the corporate seal. May I here ask for a rising vote of thanks to Miss Hodgins?

Respectfully submitted

EXIRE O'DAY
ESTHER MEIL
LOUISE SCHWARTING, *Chairman*

September, 1940

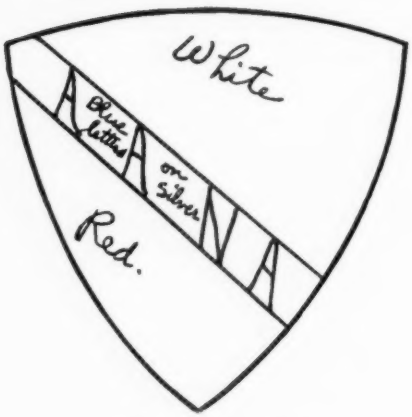
After the design was chosen by the membership it was suggested that the explanation of the significance of the design be sent out with each pin in order to add to the pleasure of the wearer.

The size of the pin and the material to be used was voted upon—the size chosen being approximately that of a one cent piece; the material, selected upon the advice of manufacturing jewelers, being a good quality of filled gold. The making of the dies will soon be in process. The time required for completion is not yet known. Further developments of general interest in regard to the seal and pin will be published in the Bulletin as they occur.

DESIGNS SUBMITTED

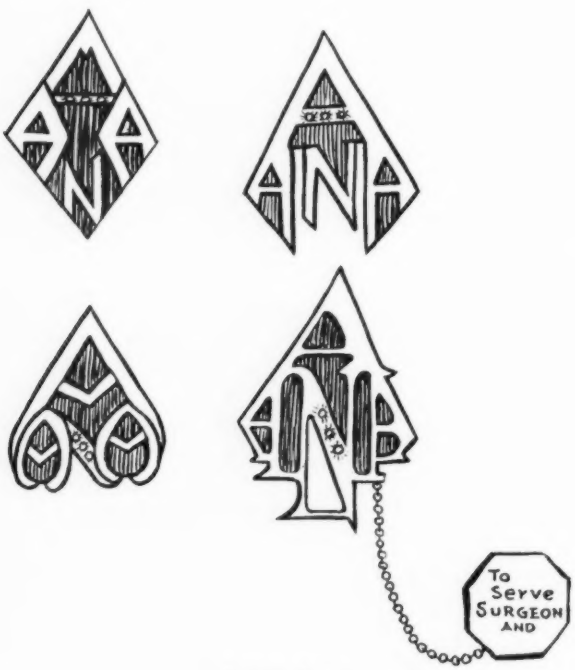
BETTY C. BROWN
Twin Falls Hospital
Twin Falls, Idaho

DESIGNS SUBMITTED



MAE B. CAMERON
Ravenswood Hospital
Chicago, Ill.

AGATHA C. HODGINS
Chatham, Mass.



IRENE ARNS
2400 S. Dearborn Ave.
Chicago, Ill.

EVELYN PROCK
Ravenswood Hospital School of Anesthesia
Chicago, Ill.

AMERICAN ASSOCIATION OF NURSE ANESTHETISTS

OFFICERS ELECTED IN BOSTON:

President	**Helen Lamb** **Barnes Hospital, St. Louis, Mo.**
First Vice-President	**Rosalie C. McDonald** **Emory University Hospital, Atlanta, Ga.**
Second Vice-President	**Rose G. Donavan** **Mt. Sinai Hospital, Philadelphia, Pa.**
Treasurer	**Gertrude L. Fife** **University Hospitals, Cleveland, O.**
Trustees	**Miriam G. Shupp** **Strong Memorial Hospital, Rochester, N. Y.** **Hazel Blanchard** **Troy, N. Y.**

REPORT OF STATE ACTIVITIES

LUCY E. RICHARDS
City Hospital, Cleveland, Ohio

In order to present a clearer picture of the progress of the state organizations which are affiliated with the American Association of Nurse Anesthetists, I believe it will be helpful to review a little of the history of the parent organization.

The organization meeting of the National Association of Nurse Anesthetists (the name being changed to "American" at the annual meeting in 1939), was called by Miss Agatha C. Hodgins, at that time Director of the School of Anesthesia of the University Hospitals of Cleveland, and was held on June 19, 1931, in the class room of the Anesthesia Department at Lakeside Hospital. It so happened that it was the same day on which the new University Hospitals group was dedicated. Forty anesthetists were present at the meeting, representing twelve states. Miss Hodgins was elected President, a constitution and by-laws was adopted, and plans made to increase the membership and encourage the formation of State Associations.

Four outstanding hospital organizations have held their initial meetings in Cleveland. The first was the American Hospital Association in 1899, with an attendance of nine persons; the American Dietetics Association in 1918; the American Association of Nurse Anesthetists in 1931; and the Ohio Association of Nurse Anesthetists also in 1931.

On November 16, 1931, the National Association of Nurse Anesthetists made application for affiliation with the American Nurses' Association, and on May 3, 1932, the following letter was recieved:

> "My dear Miss Hodgins:
>
> "The application of the National Association of Nurse Anesthetists for affiliation with the American Nurses' Association was considered at a meeting of the Board of Directors of the American Nurses' Association, held in San Antonio, Texas, on April 9, 1932, and it was voted as follows:
>
> 'That inasmuch as the avenue to membership in the American Nurses' Association of all nurse anesthetists should be the avenue already established; namely, through their Alumnae, District and State Associations, the application for membership of the National Association of Nurse Anesthetists for affiliation with the American Nurses' Association could not be accepted.'
>
> "We believe that many nurses in your Association are already members of the American Nurses' Association, and hope that those who have not yet so allied themselves, will desire to do so in the near future."
>
> (signed) SUSAN C. FRANCIS, *Secretary*

Following the serious illness of Miss Hodgins in 1933, the work was carried on by Gertrude Fife, Corresponding Secretary, until the first annual meeting. On May 10, 1933, a letter was received by Mrs. Fife from Dr. Bert W. Caldwell, Executive Secretary of the American Hospital Association, stating that the American Hospital Association would particularly welcome a meeting of the nurse anesthetists in conjunction with the annual convention of the American Hospital Association, September 11 to 15, 1933, to be held in Milwaukee, Wisconsin.

On May 18th a meeting of the members of the National Association in Cleveland was called to consider this invitation, and by unanimous vote it was decided to hold the first annual convention concurrently with the American Hospital Association, Mrs. Fife being appointed to take care of convention arrangements.

Before the invitation to meet with the American Hospital Association was received in May of 1933, the total amount in the treasury was $492.25, representing fees and dues for less than one hundred members. The report of the Treasurer at the meeting held in Milwaukee showed that from January to September, 1933, a total of $1574.42 had been received in fees and dues from 503 members. The organization continued to grow rapidly following the arrangement to meet each year with the American Hospital Association and today the membership totals approximately 2170. At the meeting in Milwaukee, Mrs. Fife was elected President and served for two terms. In 1935 Hilda Salomon succeeded Mrs. Fife and held office until Miriam G. Shupp was elected in 1937.

Early in the history of the Association, Miss Hodgins initiated an extensive correspondence with key people in various parts of the country asking them to assume leadership in organizing their respective state associations. It is interesting to note that on December 2, 1931, a meeting was held in Cleveland to form the Ohio Association of Nurse Anesthetists and that the Alabama Association was also organized during the same month. As an instance of the interest taken by state leaders in organization work, an anesthetist in one state, in connection with the effort to effect an organization of the anesthetists in that state, sent out thirty-four letters written by hand. Many such examples could be given from the early history of the state organizations.

In the first years of the publication of the Bulletin, time and secretarial service available did not permit the correspondence that would have been necessary to ascertain the exact dates and other details of all organization meetings of the Associations that were first formed, but from the information obtained from the volumes of the Bulletin we find a record of the successive affiliation of twenty-five state associations, as follows:

Year	*State*	*First President*
1931	Ohio	Gertrude L. Fife, University Hospitals, Cleveland
	Alabama	Verna M. Rice, Mobile
1932	Tennessee	Gertrude Alexander Troster, Memphis
	New York	Cora McKay, Albany Hospital, Albany
	Texas (reorganized Dec. 11, 1935)	Dorothy M. Hoadley, Methodist Hospital, Fort Worth
	Michigan (reorganized) Nov. 13, 1937)	Esther Meil, Henry Ford Hospital, Detroit
	Pennsylvania	Mary E. Walton, Mercy Hospital, Pittsburgh
1934	Virginia	Maude M. Fleming, Norfolk Protestant Hospital. Norfolk

Year	*State*	*First President*
1935	Minnesota	Ruth Bergman, Mounds Park Hospital, St. Paul
	California (reorganized)	Myra B. Quarles, Children's Hospital of the East Bay, Oakland
	Missouri	Helen Lamb, Barnes Hospital, St. Louis
	Oregon	Aimee L. Doerr, Multnomah Hospital, Portland
1936	Mississippi	Emma Easterling, Vicksburg Clinic, Vicksburg
	Florida	Ida Tedford Ellis, Orlando
	Colorado	May M. Carpenter, Denver
	Nebraska	
1937	Wisconsin	Catherine Cameron, St. Joseph's Hosp., Milwaukee
	Hawaii (later dissolved)	Esther Myers, Queen's Hospital, Honolulu
	Oklahoma	Pierina Egan, Wewoka Hospital, Wewoka
	Indiana	Margaret P. Church, Fort Wayne
1938	Illinois	Mabel Nichol, St. Joseph Hospital, Chicago
	Washington	June Roberts, Sacred Heart Hospital, Spokane
	Georgia	Rosalie C. McDonald, Emory University Hospital
1940	Louisiana	Mary Koenig, Charity Hospital, New Orleans
	New Jersey	Della Logan, Cooper Hospital, Camden
	Iowa	Sister Mary Pauline, Mercy Hospital, Des Moines

The following sectional associations have also been organized:

Mid-South Post Graduate Nurse Anesthestists' Assembly

1939 Southeastern Assembly of Nurse Anesthetists
(states represented: Alabama, Georgia, Florida, Mississippi and Louisiana)

1940 Mid-West Nurse Anesthetists' Assembly
(states represented: Arkansas, Colorado, Kansas, Missouri and Oklahoma)

Michigan, Illinois and Indiana anesthetists held their annual meeting concurrently with the Tri-State Hospital Association

All state organizations hold at least an annual meeting with a thoroughly planned program including speakers of state and national prominence. In addition some of the state groups are holding regular monthly, bi-monthly or other stated meetings during the year. Judging from the reports published in the Bulletin, among the most active are California, Colorado, Michigan, Minnesota, Pennsylvania, Oregon, Texas, Virginia and Washington. Practically without exception the State Associations hold their annual meetings in conjunction with their respective State Hospital Associations.

In February, 1934, the Bulletin began a department covering activities of the state organizations—a section which has stimulated interest in organization work throughout the country. Programs and reports of state meet-

ings are included, as well as pictures of state presidents elected, so far as it is possible to obtain them.

In 1939 the anesthetists in Minnesota sponsored a series of five lectures given by Dr. Ralph Knight for anesthetists in Minnesota and surrounding states. A second series of two lectures held in February, 1940, given by Dr. John S. Lundy and Dr. Knight, drew an attendance of one hundred and seventy-five anesthetists and doctors. The Minnesota Association maintains a circulating library for its members, and mails mimeographed Official State Bulletins to its membership list regularly. The Wisconsin organization issued a compact and well-planned booklet listing the members and outlining its activities. In Texas, the Fort Worth and Dallas District Associations have held many interesting meetings.

There are 1803 members in the organized states, the four largest being Pennsylvania, with 252 members; Illinois with 219; New York, 168; and Michigan, 115 members; the state organizations representing 83.5 per cent of the total membership of the American Association of Nurse Anesthetists.

The state groups where annual meetings of the American Association have been held have always cooperated splendidly in taking care of local arrangements and making thoroughly welcome the visiting anesthetists, and these friendly contacts have reacted to the benefit of both the state and national associations.

The Missouri Association donated $50.00 to the American Association in appreciation of the help given the Missouri group in their organization work; and the New York Association at their annual meeting in May, 1940, voted to contribute the sum of $100.00 towards the expense of the educational survey.

REPORT OF THE TRUST FUND COMMITTEE

Madam Chairman:

As chairman of the Trust Fund Committee, I beg leave to submit its annual report.

The committee recommends that a resumé of the Trust Fund document be published once each year as a means of information to each year's new membership.

(signed) VERNA M. RICE, *Chairman*

September 17, 1940.

AMENDMENTS TO THE BY-LAWS

Adopted by the members in general assembly at the eighth annual meeting held in Boston, Mass., September 16-19, 1940

Article V—Section 3-f changed to read:

An applicant who has not been graduated from a special course in the administration of anesthetics, but has been engaged in the giving of anesthetics for a period of six (6) consecutive years prior to 1939, may upon the presentation of the required credentials as approved by the Board of Trustees apply for active membership. Said applicant must be engaged in the administration of anesthetics when application for membership is made.

Article V—Section 3-g changed to read:

An applicant who has had less than six (6) years' experience and less than a six (6) months' course in the administration of anesthetics prior to 1939, does not qualify for active membership, until she has had three (3) consecutive years' experience in anesthesia in approved hospitals, with an additional year's experience required, each year, beginning September 1, 1941. Said applicant may after this period and upon presentation of required credentials as approved by the Board of Trustees apply for active membership. Applicant must be engaged in the administration of anesthetics when application is made.

Article V—Section 3-j changed to read:

Any member who is no longer engaged in the administration of anesthetics but who was accepted as an active member, may retain her membership as such with the rights and privileges of all active members, as long as she conforms with the rules of the Association.

Article V—Section 4-a:

To be omitted.

Article V—Section 4-d becomes Article V—Section 4-a and reads:

If a member is no longer actively engaged in the administration of anesthetics and has retired because of age, physical disability, or has changed her service or married, she is eligible for associate membership upon reapplication for such classification.

Article V—Section 4-e becomes Article V—Section 4-b and reads:

An active member who for reasons satisfactory to the Board of Trustees, such as illness, or absence from the United States for a period of not less than one (1) year may during this time be allowed associate membership upon reapplication for such classification.

Article V—Section 4-b becomes Article V—Section 4-c and reads:

An associate member who, at the time of her application was eligible for active membership, but for satisfactory reasons became an associate member, requests active membership must make application as an active member and pay the required initiation fee.

Article V—Section 4-c becomes Article V—Section 4-d and reads:

An associate member, who was approved as an active member and paid dues as such but for satisfactory reasons became an associate member and again desires active membership after a period of more than two (2) years must reapply as an active member.

Article V—Section 4-f becomes Article V—Section 4-e and reads:

A special blank shall be provided to applicants for associate membership by the Executive Secretary who

shall refer all applications to the Membership Committee for consideration.

Article V—Section 4-g becomes Article V—Section 4-f and reads:

Associate members shall be privileged to attend all meetings of the Association; they may have a voice but shall not have the right to vote or hold office.

Article V—Section 4-h becomes Article V—Section 4-g and reads:

No nurse actively engaged in the administration of anesthetics, except for reasons as stated in Article V—Section 4-b, shall be entitled to associate membership.

Article V—Section 5 changed to read:

Honorary membership may be conferred by a unanimous vote of the voting body at any annual meeting on persons who have rendered distinguished service to Anesthesiology or to the American Association of Nurse Anesthetists, the names having been recommended by the Board of Trustees. Members of the American Association of Nurse Anesthetists elected to an honorary office or membership, shall have all the rights and privileges of the Association but shall be exempt from payment of dues. Non-members elected to an honorary office or membership, shall have all the rights and privileges of the Association except that they shall not be entitled to hold office or vote and shall be exempt from the payment of dues.

Article X—Section 2:

To be omitted.

Section 3 becomes Section 2; Section 4 becomes Section 3; Section 5 becomes Section 4; Section 6 becomes Section 5.

VITAL CAPACITY IN RELATION TO POST-OPERATIVE PULMONARY COMPLICATIONS

ELLIOTT C. CUTLER, M.D.

Moseley Professor of Surgery, Harvard Medical School,
Surgical Clinic, Peter Bent Brigham Hospitat,
Boston, Massachusetts

Read at the eighth annual meeting of the American Association of Nurse Anesthetists, held in Boston, Mass., September 16-19, 1940.

As early as 1915-1916 I became greatly interested in postoperative pulmonary complications, and at that time Dr. John Morton and I published some studies made while we were Resident Surgeons at the Massachusetts General Hospital. In the intervening twenty-five years I have frequently wrestled with this problem and now present to you additional data. In 1928, Dr. John Powers studied the vital capacity of a large number of patients in my clinic in Cleveland, because I believed that, once atelectasis was established as a postoperative pulmonary complication, the circulation itself might play a rôle in this most common postoperative malady. This preliminary study by Powers suggested, (1) that reduction of vital capacity had to deal with the field of operation and, (2) that preoperative low vital capacity indicated greater susceptibility to postoperative pulmonary complications. In an attempt to study further this important matter we have embarked at the Peter Bent Brigham Hospital upon a lengthy study of vital capacity of all surgical admissions, irrespective of the type of disease. For this purpose a technician has been assigned to do nothing but this work and to secure determinations daily on all patients, whether preoperative or postoperative. At this time more than one thousand cases have already been studied, and perhaps fragments of this study may be of interest to you, although our conclusions must await a larger number of cases.

Chart I shows the effect of the location of the incision on the immediate postoperative vital capacity. Note, as would be expected, that the upper abdominal incision, which greatly restricts respiration through pain as well as the dressing, causes the greatest reduction of vital capacity. Note, however, the relatively high reduction in vital capacity even with the lower abdominal incision. By way of contrast finally note that the operations upon the extremities produce no effect upon vital capacity. To those familiar with the incidence of postoperative complications, it is clear that these observations bear a direct relationship to the incidence of such sequelae.

Chart II shows the effect of anesthesia. Note that where operations upon the extremities or minor gynecological procedures which do not open the abdomen are concerned, there is a negligible reduction in vital capacity regardless of the type of anesthesia. When we come to the study of inguinal or femoral incisions for the classical operation of herniorrhaphy, it is again of interest to note that the reduction in vital capacity bears no specific relation to particular anesthetic agents. In fact, it is of interest that in this small group of cases a greater median reduction took place in those patients who had had local anesthesia and that the least

occurred in those who had had inhalation anesthesia. This may be interpreted as evidence that it is the wound which by pain restricts the amplitude of respiration and that the anesthesia of itself is not a fundamental factor.

In Chart III we see the effect of the incision in relation to the incidence of postoperative pulmonary complications. Note the relatively greater number of pulmonary complications with the upper abdominal incision, their decreased occurrence with the lower abdominal incision, and their almost complete absence in operations on the extremities and in minor gynecological and rectal procedures. If one plots the percentage of several thousand complications using no other criteria than this relation to the wound, the same relative discrepancies occur.

In Chart IV may be seen the influence of the anesthetic on the production of postoperative complications when all other factors are disregarded. Note the very small difference in percentage between inhalation and spinal anesthesia. There are several factors which must be borne in mind of course in evaluating this. We tend to use spinal anesthesia on patients who have emergency surgery and at the same time have upper respiratory infections, and this may possibly cause an occasional complication to fall to the lot of spinal anesthesia, which would otherwise have gone to the inhalation group. As a balancing factor, however, in our clinic we use inhalation anesthesia almost entirely for our upper abdominal surgery, and hence we would naturally expect a higher incidence of complications on this ground alone. The small number of cases when local anesthesia was used and the fact that local anesthesia is frequently used in minor procedures prevents us from laying too much stress on the few complications following its use.

In Chart V we have divided the cases with abdominal operations according to the level of the preoperative vital capacity. In the group with a reduced vital capacity there are too few cases to be of much statistical significance, but it would seem that there is a trend toward an increased incidence of postoperative pulmonary complications in this group. Ten of one hundred cases with a preoperative level below 2500 cc. developed pulmonary complications, as against eleven of one hundred eighty-two cases with a preoperative level above 2500 cc.

In Chart VI the relation of sex to postoperative pulmonary complications is illustrated. This brings out once more the well-known greater frequency of these complications in males as contrasted with females. The reason for this invites speculation and is not yet understood. We can emphasize, however, the greater tendency in women to thoracic respiration as constrasted with abdominal respiration in men.

Finally, in the next two charts (Charts VII and VIII) we have analyzed the individual cases developing pulmonary complications. The figures in the right-hand column, representing the percentage of decrease, show but little variation from the decrease that results from the site of the incision itself. They suggest that the decrease is due to the restriction of respiration as a result of the incision and dressings, which cut down the vital capacity, and not as a result of the pulmonary complications save in unusual circumstances. Here we may note the extraordinary decrease in vital capacity in a case with massive atelectasis following an

inguinal hernia, where there was an 88 per cent decrease.

On the whole our studies so far reemphasize the extraordinary reduction in vital capacity after abdominal incisions and particularly after epigastric incisions. It would seem to us that the duration of the operation and the choice of anesthetic agent are not in themselves of fundamental importance. The striking correlation between the incidence of postoperative pulmonary complications in the group which has the greatest reduction of vital capacity suggests that any method for preventing the fall in vital capacity will exert a favorable influence on the incidence of pulmonary complications. It is unfortunate that we do not have at hand a drug which will remove pain in the abdominal incisions and at the same time will not cut down the amplitude of effort by depressing the respiratory center. It is well known that decreased respiratory efforts of themselves are a serious embarrassment to adequate circulatory efficiency, which in turn may play a major rôle in the postoperative thrombotic lesions, a danger in major surgery.

Thus it is not anesthetic technique nor the anesthesia itself which is at the basis of these postoperative pulmonary complications, but the restriction to respiration that follows abdominal incisions. Diminished respiration leads to atelectasis, either general and "massive" or the scattered and patchy form. If morphine is added to this, a serious reduction in vital capacity may result with its dangerous anoxemia. I have spoken to defend the anesthetists who have been blamed long and unjustly for these postoperative pulmonary complications. Nineteen years ago I made a similar plea before the American Association of Anesthetists, but they did not want my defense and kept on blaming themselves. Now with additional data before us, you will perhaps accept the surgeon's desire to shift this responsibility and criticism from your shoulders to his.

I

VITAL CAPACITY STUDIES

Peter Bent Brigham Hospital

Effect of Location of Incision on Postoperative Vital Capacity

		Vital Capacity		*Median Decrease*
Location of Incision	*No. of Cases*	*Av. Preop.*	*Av. P.O. 1*	*Per Cent*
Upper Abdomen	55	2450	1000	59.
Male	24	2950	1200	59.
Female	31	2100	850	59.
Lower Abdomen	135	2900	1550	45.
Male	53	3500	1800	51.
Female	82	2550	1450	44.
Extremities	72	3050	2850	1.
Male	33	3750	3550	2.
Female	39	2450	2300	0

II

VITAL CAPACITY STUDIES

Peter Bent Brigham Hospital

Effect of Anesthesia on Postoperative Vital Capacity

		Vital Capacity		*Median Decrease*
Extremities	*No. of Cases*	*Av. Preop.*	*Av. P.O. 1*	*Per Cent*
Total Anesthetics	69	3000	2850	1.
Inhalation	18	2900	2750	0
Spinal	25	2700	2550	1.
Local	26	3300	3150	1.
Minor Gynecology				
Inhalation	49	2400	2250	3.
Herniorrhaphy (inguinal or femoral)				
Total Anesthetics	42	3450	1900	46.
Inhalation	14	3650	2100	42.
Spinal	21	3350	1800	48.
Local	7	3400	1700	52.

III

VITAL CAPACITY STUDIES

Peter Bent Brigham Hospital

Effect of Operative Site on Postoperative Pulmonary Complications

	No. of Cases	*No. of P.O.P.C.*	*Per Cent*
Total Procedures	870	25	2.9
Upper Abdomen	90	10	11.1
Lower Abdomen	250	11	4.4
Extremities	107	1	0.9
Vagina, Anus, Buttock	151	0	0
Neck, Throat, Nose	88	0	0

IV

VITAL CAPACITY STUDIES

Peter Bent Brigham Hospital

Effect of Anesthetic on Postoperative Pulmonary Complications

	No. of Cases	*No. of P.O.P.C.*	*Per Cent*
Anesthetics (total)	870	25	2.9
Inhalation	580	19	3.3
Spinal	156	5	3.2
Local	121	1	0.8
Other (evipal, etc.)	13	0	0

V

VITAL CAPACITY STUDIES

Peter Bent Brigham Hospital

Relation of Preoperative Vital Capacity to Postoperative Pulmonary Complications

	Below 2000 cc.	2000 cc.-2499 cc.	2500 cc.-2999 cc.	Above 3000 cc.
Total Cases	33	67	83	99
Total Complications	4=12%	6=9%	5=6%	6=6%
Upper Abdomen				
Male	1	4	11	14
Complications	0	0	3	2
Female	20	18	11	1
Complications	1	3	1	0
Lower Abdomen				
Male	2	5	12	55
Complications	1	1	0	4
Female	10	40	49	29
Complications	2	2	1	0

VI

VITAL CAPACITY STUDIES

Peter Bent Brigham Hospital

Relation of Sex to Postoperative Pulmonary Complications

	No. of Cases	*Complications*	*Per Cent*
Upper Abdomen	90	10	11
Male	31	5	16
Female	59	5	8
Lower Abdomen	249	11	4
Male	95	6	6
Female	154	5	3
Total	339	21	6
Male	126	11	8+
Female	214	10	5—

VII

VITAL CAPACITY STUDIES

Peter Bent Brigham Hospital

Analysis of Cases Developing Postoperative Pulmonary Complications

Lower Abdomen (11 of 250 = 4.4%)

Operation	*Anesthesia*	*Complication*	*Vital Capacity* *Preop.*	*P.O. 1*	*Decrease* *Per Cent*
Appendectomy	Ether	Bronchopneumonia	2300	1000	56
"	Local	Bronchopneumonia	3300	700*	79
Hysterectomy (total)	Ether	Bronchopneumonia	2500	1700	32
" (subtotal)	Ether	Atelectasis, mild	2000	1100	45
Ileocolostomy	Ether	Pneumonia	1500(pain)	1000	33
Salpingectomy (ectopic)	Ether	Atelectasis, mild	2200	1000	55
Ileosigmoidostomy	Spinal	Lobar pneumonia	1700	800	53
Inguinal Herniorrhaphy	Avertin-Ether	Massive collapse	4000	500	88
" "	Avertin-Ether	Atelectasis	4100	1200*	71
" "	Spinal	Bronchopneumonia	3100	1400	55
" "	Spinal	Atelectasis	1900	700*	63

*Reading second postoperative day

VIII

VITAL CAPACITY STUDIES

Peter Bent Brigham Hospital

Analysis of Cases Developing Postoperative Pulmonary Complications

Upper Abdomen (10 of 90 = 11.1%)

Operation	*Anesthesia*	*Complication*	*Vital Capacity* *Preop.*	*P. O. 1*	*Decrease* *Per Cent*
Gastric Resection	Spinal-Ether	Pneumonia	2700	1000	63
" "	Ether	Atelectasis	2700	1300	52
" "	Avertin-Ether	Bronchopneumonia	3500	900	74
Cholecystectomy	Avertin-Ether	Bronchopneumonia	2300	600	74
"	Ether	Infarcts	2500	1250	50
Cholecystectomy and Choledochostomy	Ether	Atelectasis	1800	800	56
Cholecystectomy and Choledochostomy	Avertin-Ether	Atelectasis	2300	800	65
Cholecystectomy and Choledochostomy	Ether	Atelectasis	2200	800*	64
Cholecystogastrostomy	Ether	Empyema	2600	900**	65
Resection of Colon (Mikulicz)	Ether	Bronchopneumonia	3100	800*	74

*Reading second postoperative day

**Reading fourth postoperative day

CEREBRAL COMPLICATIONS FOLLOWING SURGICAL OPERATION: PREVENTION AND TREATMENT

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Read at the eighth annual meeting of the American Association of Nurse Anesthetists, Boston, Mass., Sept. 16-19, 1940.

The term "anoxia" popularly calls to mind the image of a patient struggling for air. The face is livid and if an incision has been made, the blood welling up in the wound is alarmingly dark. In short, the patient is "cyanotic." This is a rather spectacular example of acute anoxia. The cause, as a rule, is evident and the treatment is obvious. There are, however, many circumstances under which a relative degree of anoxia may persist over a period of months or years. In such cases the symptoms are few and indeed they may be absent. Nevertheless, such a subacute or chronic anoxic state leaves a characteristic imprint on tissues in the form of increased fibrosis and cellular degeneration. Furthermore, it lowers the physiologic margin of reserve. The clinical manifestations of relative anoxia may be confined chiefly to one organ or system but study of the histologic pathology reveals evidence of widespread changes in every part of the body.

Appreciation of these facts is essential in devising a plan to aid in the prevention and treatment of cerebral complications which may follow surgical operation. We feel that "postoperative cerebral complications may occur as a result of cerebral anoxia; that the anoxia is usually secondary to an acute circulatory collapse precipitated by the administration of an anesthetic, plus the trauma of operation in individuals whose margin of circulatory reserve has been reduced."

The difficulties inherent in proper appraisal of the ability of some patients to withstand surgical operation are well known to all clinicians. We are not so much concerned about the obvious "bad risk." In such cases laboratory findings usually confirm clinical judgment. The experienced surgeon and anesthetist are prepared for any eventuality and take every precaution to safeguard the patient. Preoperative preparation, choice of procedure and anesthetic, and postoperative care usually receive special consideration. This additional consideration of the patient is extremely important and our cognizance of this may account for the relatively small number of cerebral complications occurring in the type of case where they might be logically expected.

Not so simple to detect and possibly of greater importance are those cases of occult impairment of the patient's reserve powers. Such cases are usually difficult to detect clinically and may be unrecognizable even by laboratory methods at our disposal. It is not practical to subject each surgical patient to a great number of clinical or laboratory procedures to evaluate possible preoperative reserve. The expense and time consumed could be justified only if there were a reasonable chance of gaining

valuable information and at present such justification does not exist. In many surgical cases time would not permit of such preoperative evaluation. Finally, most of the clinical tests of visceral function are insufficiently delicate to detect latent alterations in physiologic function, which may become significant only under the added stress imposed by surgical operation.

What preventive measures are available, then, against these postoperative cerebral complications which result from the additional anoxia of anesthesia and surgical procedure on patients with latent circulatory insufficiency?

Surgeons and anesthetists should be prepared to accept the fact that even in the absence of clinical signs, relative degrees of anoxia exist in many patients requiring surgical operation: the patient who has chronic cardio-circulatory disease, the patient who is anemic, the patient in shock, the patient with hyperthyroidism or diabetes mellitus, the jaundiced patient, the patient with diarrhea or vomiting — all these and many others suffer from varying degrees of tissue anoxia. In such cases surgical operations almost invariably superimpose additional anoxia.

The surgeon must exercise eternal vigilance before, during and after operation. At times this is extremely difficult to maintain. This is especially true when the surgeon must accept the responsiblity not only for the performance of the surgical operation but also for the administration of the anesthetic. Nevertheless, a high degree of cooperation between anesthetist and surgeon can be obtained if the surgeon receives a periodic verbal report as to the state of the pulse, respiratory rate and blood pressure during the operation. The surgeon should never hesitate to abandon the operative procedure temporarily and to devote his entire attention to the measures which will restore normal respiratory and circulatory function in the anesthetized patient. This may require intravenous therapy, blood transfusion and introduction of an intratracheal catheter, aspiration of the air passages or mechanical methods of aiding respiration. In many instances, the temporary abandonment of the operation, the removal of retractors, the covering of the wound with hot moist packs and a two or three minute rest period, suffice to raise the blood pressure toward a normal level. The tendency to add speed in an effort to complete the operation in the face of a falling blood pressure is to be deplored; most commonly this results in added trauma and greater drop in the blood pressure.

The importance of maintaining a comparatively (for the individual patient) normal blood pressure during operation has already been suggested. Blood pressure reflects the tone of the circulatory system and gives early intimation of impending circulatory collapse. If the operation is of such magnitude that an appreciable fall in blood pressure must be anticipated the prophylactic infusion of intravenous fluids should be begun before the skin incision is made. Fluid is usually administered in the form of 5 per cent dextrose solution and may be supplemented by whole blood when necessary.

Spinal anesthesia is becoming more and more popular and justly so, but it requires a special word of caution. Spinal anesthesia commonly produces depression of the blood pressure. While in many cases the cerebral manifestations of such a drop may be absent, or at most, confined to a more or less severe postoperative

headache, the surgeon must not lose sight of the fact that such depressions of blood pressure are potentially dangerous since depression of blood pressure implies temporary insufficiency of blood flow and therefore, relative oxygen lack to essential viscera. In most cases the use of ephedrine sulphate or neosynephrine hydrochloride is almost uniformly effective in restoring the blood pressure to its preoperative level. However, caution must be used in administering these drugs when the blood pressure has fallen to or below the critical level, since the vasoconstrictive effect of the drug may accentuate the effect produced by pooling of blood in the venous system.

Equally important as the maintenance of blood pressure is an adequate supply of oxygen during the operative and postoperative periods alike. Obstruction of the airway from any one of a number of causes may bring about serious embarrassment to respiratory function during and after the course of an operation. Such obstructions are particularly common in operations upon the nose and throat, the thyroid gland, and in an emergency where an anesthetic must be administered without benefit of a preparatory period of starvation. The value of oxygen therapy in the treatment of many medical and surgical diseases has long been recognized. Perfection of new methods of administration of the gas such as the B.L.B. mask, which promotes the administration of oxygen in concentrations of almost 100 per cent has extended its availability. The wider use of oxygen therapy in the immediate postoperative periods where it is warranted by severity of the operation, lowered blood pressure and rapid pulse, dyspnea or cyanosis, and in cases of severe anemia, serves to prevent postoperative complications.

There has been a growing tendency in recent years toward the wider use of hypnotic and sedative drugs, particularly of the barbiturates in the preoperative period. The judicious use of such drugs doubtless helps to maintain the psychic equilibrium of the nervous patient before operation. Too often however, such large doses of drugs are used that the patient comes to operation with a greatly depressed respiratory center and a state of subacute anoxia already present. Such patients when subjected to the additional anoxia of anesthesia become potential victims for regrettable and avoidable cerebral accidents. Too much emphasis cannot be placed on the danger of overdosage with barbiturates and opiates in daily surgical practice, as well as in obstetrics.

Of prime importance in the prevention of cerebral accidents is a thorough knowledge from the history of factors which might precipitate such complications. While there is some excuse for failure to carry out a multitude of laboratory procedures, there can be no excuse for failure to obtain an accurate history and to perform a careful physical examination on each patient prior to operation.

It becomes clearly evident, then, that it is of greatest value to the surgeon and the anesthetist to be constantly on the alert for cases which may be predisposed to postoperative cerebral accidents: they must always bear in mind that such possibility exists. The surgeon who states that he does not see such accidents in his practice is either doing very little surgery or does not recognize the true nature of the accidents when they occur.

TREATMENT

The treatment of postoperative cerebral accidents is discouraging. An ounce of prevention in these cases is worth many pounds of treatment. Too often the changes produced by oxygen lack are irreversible but milder forms of cerebral complications, namely, the confusion states, the postoperative psychoses and even many of the muscular disturbances, may often disappear as the general condition of the patient improves.

Evidence of the existence of some type of cerebral accident dependent upon anoxia may occur while the patient is still in the operating room. At other times such evidence in the form of postoperative psychosis, convulsions or hemiplegia does not become manifest until several hours or days after the operation. Their occurrence calls for the use of the same measures which are important in the prevention of cerebral complications, namely, the maintenance of blood volume, the support of the circulatory system, and the administration of adequate oxygen. Blood volume is best restored by transfusion of whole blood or blood serum, while oxygen may be administered by any of the methods commonly in use, preferably by mask or tent.

When cerebral accidents occur, knowledge that they are central nervous system manifestations of general circulatory insufficiency should guide treatment. Many cases are harmed rather than helped by treatment aimed at overcoming hyperactivity of the central nervous system by the use of morphine, barbiturates or spinal drainage. Such treatment leads only to further circulatory depression.

SUMMARY AND CONCLUSIONS

1. Emphasis has been placed on the importance of recognizing the type of case which is a potential victim of cerebral postoperative complications.

2. Measures designed to prevent such accidents have been discussed.

3. The treatment of cerebral complications has been discussed and the injudicious use of morphine derivatives and barbiturates is condemned.

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CARBON DIOXIDE HYPERVENTILATION POSTOPERATIVELY

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Read at the eighth annual meeting of the American Association of Nurse Anesthetists, held in Boston, Mass., September 16-19, 1940.

You now have with you not a surgeon nor an anesthetist but one of those "certified internists" with a particular interest in the lungs. That interest led to a personal study of all the postoperative pulmonary complications occurring on the surgical wards at the Massachusetts General Hospital in a two-year period and an attempt to prevent them by postoperative carbon dioxide hyperventilation [1], [2], [3], [4]. I shall try to answer only one question:

Does carbon dioxide hyperventilation prevent postoperative pulmonary complications?

By "postoperative pulmonary complications" I mean that type which occurs in the first four postoperative days and is characterized by fever, cough and purulent expectoration. This does *not* include proved pulmonary embolus, lung abscess, empyema or the exacerbation of pre-existing tuberculosis. Of 630 complications studied by me, only 30 were true pneumococcus pneumonia in the medical sense; 200 were bronchitis with fever, cough and expectoration but no lung changes; and 400 were atelectasis or collapse with varying degrees of infection called "pneumonitis."

My closet is full of records, punch cards, charts and tables covering the two-year study. I shall make no statements which these statistics cannot support but shall spare you an exhibit of the tables. In preparing this paper I have wiped the dust from my old records, reviewed the articles written since my observations, and have checked through the year 1939 the biweekly surgical reports which theoretically list all the postoperative complications. I have found nothing in this recent study to make me change my original conclusions published some years ago.

Before taking up in detail the actual study of our use of carbon dioxide I should like to state certain facts which I believe are established. (1) If all .the pulmonary complications are carefully recorded, no definite seasonal incidence will be found. (2) Complications occur most commonly after laparotomy, operation for hernia and operation on the thyroid. They are very infrequent after operation in other fields. The ratio of complications after laparotomy and herniorraphy in comparison with all other operations is about 13:1. (3) Complications occur much more frequently after operation on the stomach, intestines and gallbladder. (4) For any type of operation the percentage of complications in the male is at least twice as high as in the female. (5) If the operation is for a perforated viscus or a septic abdominal condition the percentage is much higher than if no septic condition is encountered. This point is brought out particularly by a study of the appendectomy group in which simple appendectomy is compared with that with drainage. (6) (This point is of especial importance for you as anes-

thetists). Complications occur no matter what type of anesthesia is used. In our series and in other published figures the percentage of complications following the use of local anesthesia for laparotomy is even higher than that for cases in which inhalation or spinal anesthesia is used. Of course, the number of cases operated upon under local anesthesia is much smaller and the preoperative condition of the patient usually much worse. As to spinal anesthesia, in 100 males between the ages of 20 and 60 who were operated upon for hernia under spinal, the percentage of complications was slightly higher but essentially the same as in a similar group operated upon under ether.

It is important then to remember that pulmonary complications occur particularly in patients who are in poor preoperative condition because of stomach or intestinal lesions, but also in patients in good preoperative condition operated on only for hernia. However, if any study is to be made of a method to prevent postoperative pulmonary complications much time can be saved by studying exclusively males who have had operations on the stomach, intestines or gallbladder. There is no special gain from the investigative standpoint in spending time on other patients. For instance, I am not at all impressed by figures which show that carbon dioxide has prevented the occurrence of pulmonary complications in women who have had pelvic operations because this group seldom develops these complications anyway.

Since all conclusions about carbon dioxide hyperventilation are based on statistical evidence, I should like to say a word about the difficulty in procuring figures on pulmonary complications. The hospital records usually note the true pneumonias and cases of massive collapse, but fail to describe many of the mild and moderately severe cases. (Apparently the intern can forget the cough which is so keenly remembered by the patient with a fresh abdominal wound). Consequently only by personal observation can one obtain a complete record of complications. In Figure 1, the curve representing the monthly percentage of complications following laparotomy and hernia operation at the Massachusetts General Hospital from 1928 through 1935 varies in accordance with the variation in the best available source for figures for the different years. First it was the discharge diagnosis file, then the surgical records, then the biweekly surgical reports, then the two-year personal observation, and finally a return to the biweekly reports. Thus the consecutive yearly percentages are 2, 5.3, 7.7, 14.3, 11.3, 7.3, 9, and back again in the year 1939 (not charted here) to 5. It is an unfortunate coincidence that the peak in the curve occurs in the years 1930

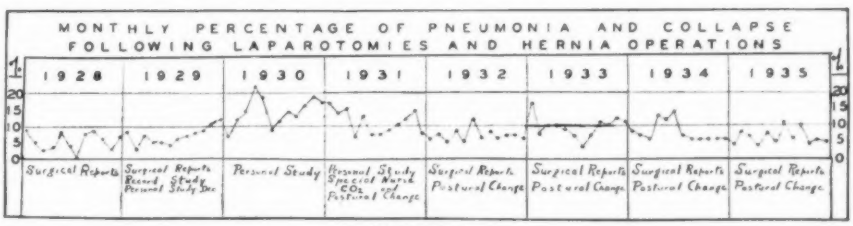
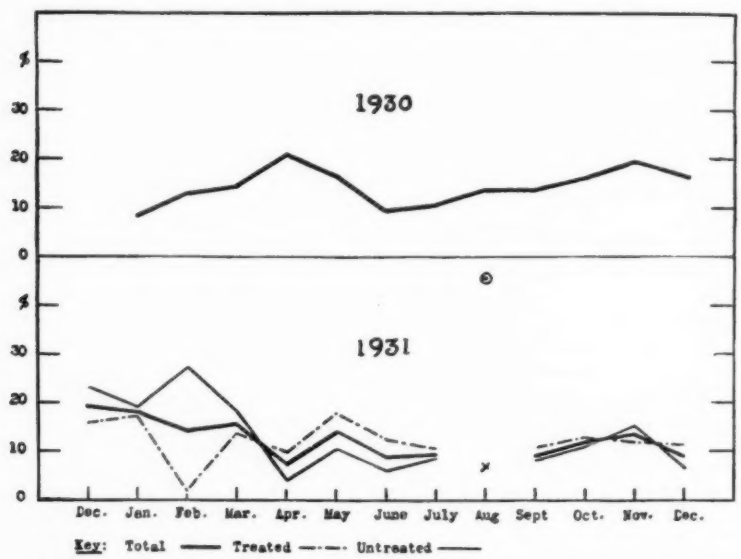


FIGURE 1

and 1931 when the surgeons and their medical gad fly were making the greatest effort to prevent complications, and one must not conclude that these higher percentages recorded mean an actual increase in complications in these years

This fact became apparent early in my study of the use of carbon dioxide. In a seven-month period in 1930 all laparotomy and hernia patients were de-etherized by carbon dioxide hyperventilation before they left the operating room. I found 13.1 per cent pulmonary complications in this group, the highest figure ever recorded in the hospital, and was unnecessarily alarmed for fear that we were actually increasing the number of complications. We soon realized, however, that this was about the expected percentage in any carefully followed group.

De-etherization was obviously not preventing complications so we abandoned this procedure and turned to carbon dioxide hyperventilation on the wards during the first three or four postoperative days. For one year we made a very careful study of the problem. For five months we had one and for seven months two full-time graduate nurses. The cases were carefully alternated because, as I have implied in my discussion of statistics, this is the only way to obtain reliable figures. For instance, we treated with carbon dioxide every other male and every other female gallbladder patient, leaving the alternates as controls. In all, 648 patients had carbon dioxide and 667 did not. The results of the study are shown in Figure 2. Here the dotted line shows the percentage of complications occurring in patients who had laparotomy or operation for hernia and were given carbon dioxide postopera-



Monthly percentage of pulmonary complications following all laparotomies and hernia operations in 1930, and following the same type of operation included in the carbon dioxide study in 1931.

FIGURE 2

tively. The light solid line gives the percentage for the patients who did not have carbon dioxide. The heavy solid line is the percentage for the whole group.

There are some peculiar facts about this chart. You will note in the first place that the results can be divided into three distinct periods. In the first four months there were fewer complications in the treated group. In one month of this period, February, we thought that the problem of postoperative pulmonary complications had been solved for all time, for there were 27 per cent complications in the untreated group and 2 per cent in the treated. By the next month, however, we had been driven from this Garden of Eden and there followed the four-month period in which the complications occurred more frequently in the treated than in the untreated group. The strange fact was that during this second four months the patients were getting from six to ten fairly long periods of hyperventilation in twenty-four hours instead of the three two-minute ones which we had used during the first four months. Consequently in July we went back to the original method—three short periods of treatment—but could not recapture our early low figures. Apparently we had not overtreated from April to July.

Then comes the final four months when we resumed routine hyperventilation every four hours or oftener, and during this period the percentage of complications in the two groups was just about the same.

As you follow the curve in the treated group you see that except for the month of February, when it drops abruptly, there is no marked variation in its level; but when you follow the curve for the untreated group you note that after the high peak in February there is a marked drop in April and that a comparatively low level in the untreated group persists during the remainder of the year. I tried hard to explain the drop in the untreated group and finally came to the following conclusion. While the study was in progress the surgeons had apparently become aware of the importance of postoperative bronchial drainage, and in March they had adopted hourly postural change as a routine procedure for these patients. As far as I could tell this was the only change in the postoperative care and certainly it had not been planned as part of the experiment.

In August, as you see, there is a break in the curves and a circle and cross have been inserted instead. During this one month we gave up the treatment of the whole group of patients and concentrated on 15 males whose operations had been on the stomach, gallbladder or intestines. They were given carbon dioxide every two hours for periods of from six to ten minutes. Pulmonary complications occurred in 46 per cent. One cannot draw conclusions from 15 cases, but in my two years of observation I had learned to expect about 40 per cent complications in this group if they were carefully followed. Certainly the most intensive hyperventilation did not reduce the percentage of complications in a small group of selected, bad risks.

From the statistical standpoint it is obvious that our work in 1931 did not solve the problem though the figures do show some gain over the previous year. In 1931, with carbon dioxide and postural change the percentage of complications after laparotomy or hernia operation was 11.3 as compared with 14.3 in 1930, and in the male gastric, intestinal and gallbladder patients 35 as compared

with 38. One important result did come from this study, however. Ever since 1931 frequent change of position has become part of routine postoperative care, and true massive collapse of the lung has practically disappeared from the hospital—somewhat to the embarrassment of the teaching surgeons and roentgenologists who are looking for cases to demonstrate to students. By massive collapse I mean the collapse of an entire lung because of plugging by secretion of the main bronchus to that side. I believe that this collapse of all the lobes of a lung can be prevented by either carbon dioxide or postural change, but collapse of a single lobe or part of a lobe on one or both sides still occurs no matter which method is used.

I should like to comment on the literature concerning carbon dioxide hyperventilation. This has been reviewed by many writers. The last review that I find is by Beck[5] in 1939. He states that the method is recommended by 33 authors and not recommended by 9. This puts me safely in the minority, but if you read these articles I think you will agree that in almost every instance the conclusions are based on a general impression or a series of cases unsatisfactorily followed or controlled. I should like, however, to quote one author and may be excused for choosing a man who agrees with me. At the New Haven Hospital from July 1, 1934 to July 1, 1936, Lindskog,[6] a staff surgeon particularly interested in the lungs, followed personally 1215 consecutive cases of the laparotomy and hernia groups. All these patients were treated postoperatively for a period of forty-eight to seventy-two hours with carbon dioxide oxygen inhalations at intervals of four hours. Of these, 10.9 per cent developed the type of complication which I have described as compared with 12.3 in my 648 treated cases. His other figures are in surprisingly close agreement with mine.

From my study, therefore, I draw the following simple conclusions: (1) Carbon dioxide hyperventilation does reduce slightly the percentage of postoperative pulmonary complications. (2) In this regard, however, it is no better than frequent postural change of the patient. (3) Either method prevents massive collapse. (4) Neither carbon dioxide nor postural change affects the percentage of complications in the male gastric patient, who is a notoriously bad risk.

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FIGURES

Fig. 1. Monthly Percentage of Pneumonia and Collapse Following Laparotomies and Hernia Operations. (From PREOPERATIVE AND POSTOPERATIVE TREATMENT, Robert L. Mason. W. B. Saunders Co., Philadelphia, 1937, p. 200.)

Fig. 2. Monthly Percentage of Pulmonary Complications Following All Laparotomies and Hernia Operations in 1930, and Following the Same Type of Operation Included in the Carbon Dioxide Study in 1931. (From *J. Am. Med. Assoc.*, 100: 1933, article: Postoperative Pulmonary Complications: II. Carbon Dioxide as a Preventive in a Controlled Series.)

ANESTHESIA IN ARMY HOSPITALS

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On mention of the army, inevitably one thinks in terms of war, while it is perhaps forgotten that during peace times this army is a very useful organization. While performing their routine duties, many of the military personnel become sick and are injured, the necessary treatment and care of these being taken over by the Medical Department and the Army Nurse Corps.

During the early wars, nursing with the armed forces was done chiefly by the Sisters of Charity and by the wives and mothers of the troops, but about 1898, at the time of the Spanish-American War, a Dr. Anita Newcomb McGee recognized the necessity of organizing trained women nurses to serve both during peace and war. Her plan for a trained hospital corps to work with the army or the navy was read and indorsed at a meeting of the Daughters of the American Revolution, and was later presented to the Surgeon General who gratefully accepted the offer to examine the qualifications of all applications received. In due course this organized corps was called on by the Surgeon General of the Army to assign nurses for service. In 1901, the trained nurse was officially recognized as part of the Medical Department, and since then steady progress has been made in the Army Nurse Corps. The year 1920 gave to them the many privileges and benefits of relative rank, and some years later the nurse was given the right to retire for length of service and also for disability.

The World War greatly increased the personnel and also the range of

duties of the Army Nurse Corps, and I think one may say that the nurse anesthetist finally made a very definite place for herself in army hospitals. Some of you I know probably took part in the very great expansion of the corps from a mere four hundred odd to the very large number of twenty-one thousand four hundred and eighty, more than ten thousand of whom were sent to foreign service. The corps continues to expand, and at present has a permanent personnel of approximately one thousand nurses. These nurses are not appointed for assignment to special duties, but any nurse having special training is usually given the opportunity of using this knowledge.

Regarding anesthesia, a full course of training in this subject is given to members of the Corps at the Army Medical Center, Washington, and also at some of the general hospitals in other parts of the country. Also members of the corps may be sent for training in anesthesia to various civilian medical centers, and during the period of training receive full salary and allowances. Approximately fifty trained anesthetists are now on duty at the various army posts.

The army maintains six general hospitals of approximately one thousand beds, and over thirty station hospitals with a bed capacity of about one hundred and fifty beds. These hospitals are situated in different parts of the United States and in Hawaii, the Philippine Islands and Puerto Rico, giving the added attraction of travel to nursing in the army. Comfortable and attractive living quarters, eight hour duty, the enjoyment of many sports such as riding, swimming, tennis, golf, et cetera, while not forgetting the opportunities for further study, make the work very pleasant.

As the army is a small world in itself, including women and children, the hospitals deal with all branches of anesthesia and surgery. At Walter Reed Hospital alone, over five thousand surgical cases were treated during last year with a total of three thousand six hundred and fifty anesthetics given, and the following is a short outline of the methods and anesthetics used:—

SPINAL ANESTHESIA

Spinal anesthesia is the choice of the surgeon for all anesthesia below the diaphragm, and is used whenever possible, having proved to be satisfactory in a large number of cases. There are many factors governing the control of this anesthetic, of which the following are a few:—

1. Posture of the patient after injection.
2. The interspace chosen.
3. Volume of fluid withdrawn, and volume of fluid reinjected.
4. Intradural pressure.
5. Dose of the drug used.
6. Specific gravity of the injected solution.
7. Fixation time of the drug by nerve tissue.
8. Area of the incision.
9. Time required for operation.

Novocaine, novocaine with nupercaine, pontocaine, metycaine and spinocaine are the drugs usually chosen, each having its own special place in spinal anesthesia.

Novocaine, considered the safest drug, is the most generally used. It is never given in a strength of over 7 per cent, as in higher concentration it has proved irritating to the spinal cord and meninges, while it is ineffectual in a strength of less than 3 per cent, 5 per cent being the percentage generally preferred. Dosage varies according to the length of

operation and position of the incision —this being true of all drugs used in spinal anesthesia. This anesthetic lasts from thirty minutes to one hour, causes slight drop in blood pressure, infrequent nausea, and leaves almost no after-effects.

Nupercaine, being six to eight times as toxic as cocaine, is a very powerful and toxic drug. It is generally given with novocaine, as the action does not take effect for about twenty minutes, and having prolonged action, lengthens the operating time for the surgeon considerably. It is excellent in high abdominal operations of long duration. With novocaine it is slightly hyperbaric, being slightly hypobaric alone.

Metycaine is used as a local anesthetic and nerve block as well as a spinal anesthetic. In spinal anesthesia it gives longer anesthesia and has greater potency than novocaine, is hyperbaric, and is generally used in abdominal operations, giving an increase of twenty to twenty-five minutes in operating time.

Pontocaine is valuable and gives excellent anesthesia for a period of from two to four hours, and is generally the choice for orthopedic operations of long duration. The drug being ten times as toxic as novocaine, its dosage is just one-tenth as great, and, having the same specific gravity as spinal fluid, is therefore isobaric. Pontocaine does not lower blood pressure as much as novocaine, causes little nausea and only slight change in pulse, while postoperative headache is rare.

Spinocaine, having a specific gravity of .065, is therefore definitely hypobaric, consequently immediate Trendelenberg position is called for. It is used in sacral and urological surgery, giving excellent relaxation for nephrectomy and all operations in kidney position. It also gives an excellent saddle anesthesia for rectal operations done in Buie position; time duration approximately one hour.

In cases of spinal anesthesia ephedrine sulphate is generally given as a prophylactic against drop in blood pressure, and is added to the local anesthetic when making the puncture.

For circulatory and respiratory stimulation, if needed during the operation, the following drugs are used as indicated:—

Neosynephrine hydrochloride
Coramine
Metrazol

and in hemorrhage or shock the following are given intravenously in order of choice:—

1. Citrated blood
2. Non-pyrogenic solution of gum acacia 6 per cent
3. Normal saline with 5 per cent glucose

The medical officer in charge of anesthesia administers the spinal anesthetic and follows the progress of the patient during the operation, while the trained nurse anesthetist watches the patient's condition, administering any necessary oxygen, medication or stimulation, et cetera, and is ready to give a general anesthetic if required.

GENERAL ANESTHESIA

In the army, nitrous oxide-oxygen or nitrous oxide-oxygen-ether is the preferred general anesthetic, the carbon dioxide absorption technique in various types of machines being used. Ethylene was tried but not continued, while cyclopropane has not yet been adopted. Nitrous oxide-oxygen with its rapid induction and anesthetization, the quick recovery of the patient to normal functioning, the small per-

centage of postoperative pulmonary complications, and also its freedom from inflammability, make it a very satisfactory anesthetic.

In pneumonectomy, lobectomy, and all intrathoracic surgery, as well as surgery of the head and neck, the oral intratracheal method of inhalation anesthesia is used where indicated, this technique having the advantage among others of affording an open airway at all times. A deep plane of anesthesia is necessary for the introduction of the laryngoscope, but later the level of anesthesia may be lightened, and the anesthetic is at all times under the complete control of the anesthetist.

Also under this heading comes the use of avertin, a basal anesthetic, which is supplemented with nitrous oxide-oxygen-ether as necessary. This anesthetic is most acceptable to the patient, is excellent for nervous patients and children, and also reduces the amount of general anesthetic necessary for complete relaxation.

PENTOTHAL SODIUM—INTRAVENOUS ANESTHETIC

This intravenous anesthetic is rapidly becoming very popular in the army, and at Walter Reed Hospital is being used as follows:—

1. Alone for operations of short duration, not exceeding forty-five minutes.
2. To eliminate the excitement stage in general anesthesia in patients with severe hypertension.
3. To allay fear and nervousness in the case of abdominal surgery where the relaxed abdomen of spinal anesthesia is almost necessary, but where the patient is disturbed.

The action of sodium pentothal is almost instantaneous and the drug is rapidly eliminated. It is a respiratory depressant, however, and great care must be taken to support the patient's chin and maintain a free airway, while oxygen under pressure must be available for immediate use if necessary. A light weight paper butterfly is placed over the nose and mouth to enable the anesthetist to follow the depth of respirations easily. The needle is kept inserted in the vein, and a 2½ per cent solution injected intermittently in the quantity necessary to keep the level of anesthesia desired. This intermittent method avoids cumulative action of the drug, and the anesthetist has complete control of the anesthetic.

It is the opinion of the medical officer in charge of anesthesia, that this intravenous anesthetic may prove to be of great use in field service, being easily transported, requiring a small amount of equipment easily assembled, and having very slight after-effect on the patient.

ANESTHESIA DURING WAR

Anesthesia in the army must always be considered under the heading of war, and for this purpose a field service surgical unit has been evolved, which is made up of one large central tent with several motor trailers. The tent is the ward or waiting room, and the trailers, consisting of four operating rooms, one sterilizing room, one kitchen, one supply room, one x-ray department, one laboratory, and one unit for making the necessary power, are attached to, and open right into the tent, forming a complete field hospital. Any one of these trailers may be detached and sent to other areas if needed.

Anesthesia by the drop ether method, so much used during the last war, would not be very satisfactory in these small operating rooms, therefore general anesthesia

has been made possible by the use of a midget type gas-oxygen-ether machine with the carbon dioxide absorption technique.

The small amount of gas and oxygen required in this absorption technique, and the great reduction in weight and size of the machine itself, have considerably lessened the transportation difficulties.

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HAZARDS IN THE USE OF EXPLOSIVE ANESTHETICS

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In considering the question of the risk involved in the use of explosive anesthetics it is important first of all to have clearly in mind the explosive properties of various anesthetics. There is evidence of a considerable prejudice against ethylene and cyclopropane which appears to be based on the assumption that they are considerably more hazardous, from the standpoint of possible injury by explosion, than is ether. The fact is that all of the hydrocarbon anesthetics form explosive mixtures with oxygen or with nitrous oxide.

When mixed with oxygen the three major hydrocarbon anesthetics are explosive when present in any concentration between the following limits: ether, 2.1 to 82 per cent; cyclopropane, 2.5 to 63 per cent; ethylene, 2.9 to 80 per cent. The most explosive concentrations are: ether, 16 per cent; cyclopropane, 20 per cent; and ethylene, 27 per cent. It is apparent, therefore, that in each case anesthetic mixtures lie within the explosive region.

In the case of ethylene, anesthetic mixtures are generally near the upper limit of inflammability. Should such a mixture escape from a closed rebreathing system it will, on entering the atmosphere, become diluted. In the early stages of this dilution the inflammability of the gas is actually increased. It is, in other words, more explosive at a short distance from the leak than it is within the rebreathing system. Cyclopropane, on the other hand, is generally used in mixtures which are near the composition having maximum explodability. Should these escape from a closed system there is an immediate decrease in inflammability. Such evidence as is available indicates that with both cyclopropane and ethylene the inflammable region in the vicinity of any leak extends no more than two feet or so in any direction. Both of these gases are

dispersed with considerable rapidity. Ether is likely to form pools from which it is dispersed into the atmosphere fairly slowly. Ether vapor may, in fact, actually flow along the floor in a continuous stream for a considerable distance. Cases are on record where such a stream has reached a wall at some distance from the operating table and has been ignited by a spark from the electric power circuit. Having been ignited, the stream acts as a fuse along which the flame travels to larger pockets which may have been formed under the drapes of the operating table.

It is evident that the danger of igniting any inflammable anesthetic gas which may escape from a closed system will be greatly reduced by active ventilation of the room atmosphere.

Many attempts have been made to appraise the relative hazards of the several gases by statistical studies. Fortunately, however, the incidence of anesthetic explosions is so low that statistics are of little significance. It is certainly true that no distinction can be made between ether, ethylene and cyclopropane with respect to the likelihood of the occurrence of an explosion. There is, however, one decided difference between these gases: the velocity of flame propagation is much higher in the case of mixtures of cyclopropane and oxygen or of ethylene and oxygen than with mixtures of ether and oxygen. Many cases are on record where ignition of anesthetic mixtures of ether have occurred without serious injury to the patient. In oral surgery, for example, ignition of the expired mixture by a hot-wire cautery is not uncommon. The velocity of flame propagation in these mixtures is, however, so low that the explosion is confined to a restricted area and does little more than cause a slight burn. Once any portion of one of the commonly used mixtures containing cyclopropane or ethylene becomes ignited, combustion immediately extends to all portions. In general, no duct is sufficiently restricted to quench the flame. For this reason a large number of all cases in which ignition of cyclopropane or of ethylene has occurred are fatal.

It is assumed that the continued use of the hydrocarbon anesthetics is justified by the fact that the risk of death or injury by explosion is less than the risks involved in the use of other forms of anesthesia. This question, however, is outside the present inquiry. Our problem here is to provide the maximum possible safeguards for the administration of the hydrocarbon anesthetics.

There are three major approaches to this problem. One, perhaps the most obvious, seeks ways and means for preventing ignition. Another attempts, by extending our knowledge of the explosive properties of mixtures including the hydrocarbon anesthetics, to obtain mixtures which are both suitable for anesthetic purposes and which, at the same time, are non-explosive. The third line of defense is to provide means for quenching any combustion which may be initiated within a closed rebreathing system at a distance remote from the patient. If this can be accomplished it is still possible, in the event that the first two lines of defense fail, for the patient to escape injury.

The most obvious method of igniting any gaseous mixture is, of course, by means of a flame or a hot body. Clearly the first step in the prevention of anesthetic explosions is to exclude all such flames and hot bodies from any location in which hydrocarbon anesthetics are used. It is an established fact that the normal operating temperature of the electric-

ally heated cautery equipment, so widely used, is sufficient to ignite practically all of the hydrocarbon anesthetic mixtures. If possible the hydrocarbons should not be used for anesthesia in operations requiring either hot-wire or electric spark cautery. Where this can not be avoided great care must be taken to avoid leaks in the rebreathing system and to provide as effective circulation of room air as possible.

Perhaps the most frequently occurring cause of ignition is electrostatic discharge. An examination of records covering past explosions suggests that something like 80 per cent of all ignitions are due to this cause. It is, therefore, necessary to consider it in some detail.

On several occasions explorations have been made of operating rooms to study the electrostatic potentials there present. One is appalled by the number and magnitude of the electrostatic charges disclosed by such a survey. It is, of course, true that conditions in this respect are at their worst during the winter months, when interior atmospheres are likely to be of low relative humidity. Similarly conditions are, in general, worse in the cold latitudes than in warm, humid regions.

Although electrostatic charges may be produced in a great variety of ways, their elimination is fundamentally extremely simple. A difference of potential between two bodies, due to electrostatic charge, can occur only when there is no electrical path of good conductivity between them. If there is a path of even moderate conductivity any charge which might otherwise collect on one of these bodies will promptly spread over both so that they come to the same electrostatic potential. Having completed this distribution, the potentials of various points on the conducting surfaces are said to be equalized. Sparks result only when there is no other path by which equalization can be effected. The complete elimination of the possibility of electrostatic discharge in an operating room can, therefore, be effected only by the complete exclusion of all insulating materials.

For some time it was thought that this elimination of insulators could be accomplished, *in effect*, by the simple expedient of maintaining the atmosphere at a high relative humidity. Various competent authorities have, in fact, stated that electrostatic discharges can not be produced in a room the atmosphere of which has a relative humidity in excess of 55 per cent. Unfortunately this specification is not sufficiently complete. It is a fact that fatal anesthetic explosions, due to electrostatic discharges, have occurred in operating rooms in which the relative humidity was 65 per cent. The factor which was not taken into account was the carbon dioxide content of the atmosphere. In order for high humidity to be effective in preventing the accumulation or retention of electrostatic charge it is necessary for the atmosphere to contain a sufficient amount of carbon dioxide to render conductive any moisture films which may form on the surface of insulators. In many hospitals the air-conditioning equipment provides high relative humidity by the so-called air-washing method. This system removes carbon dioxide to such an extent that any moisture films which may form are of insufficient conductivity to provide paths adequate for the dissipation of charge. In itself, therefore, high humidity is not to be depended upon as a cure-all for the electrostatic ignition of anesthetic mixtures.

Since it seems impossible to annul the effect of insulators in the operat-

ing room by any simply applied expedient, it becomes necessary for us to study other alternatives. As we have seen, insulators are dangerous because they constitute barriers which prevent the flow of electrostatic charge from one conductor to another. This effect may be annulled by providing a bridge across each such barrier. In its simplest form this bridge may be merely a wire, or other metallic conductor, joining the two conductive bodies in question. The use of such bridges over insulating barriers is known as intercoupling. It may be carried to the point where all conductive bodies in an operating room are thus maintained at a single potential. Under these conditions no spark can jump between any two of them. While such a remedy greatly reduces the possibility of a spark discharge between conductive bodies, there are other types of discharge, to be discussed later, against which it offers no protection. In spite of the fact that it is not completely effective, intercoupling does greatly reduce the hazard of igniting explosive anesthetics. In general, it is inexpensive. When carried out by means of flexible conductors, however, intercoupling introduces a certain amount of confusion into the operating room. It is, naturally, undesirable to have leads connecting persons and objects. On the other hand, if intercoupling is applied to a restricted group, selecting only those persons and objects most frequently present in an area likely to contain an explosive gas, the inconvenience may be tolerated. From the standpoint of the electrostatic hazard alone effective intercoupling may be obtained by attaching a number of wires to some convenient point, such as the anesthesia machine or the operating table. During anesthesia the remaining objects in the danger zone may be connected to this point, each by its own wire. The objects which it is most desirable to intercouple are the patient, the anesthetist, the anesthesia machine and the operating table. There is an added advantage if this intercoupled group is also connected to the building ground.

In applying this intercoupling, however, there are certain other factors which must be considered. It is unfortunately true that in many operating rooms adequate precautions are not observed in the installation of the electrial equipment. This applies particularly to portable equipment. Unless this is carefully installed in accordance with the regulations of the National Electrical Code, there is a possibility that persons or objects may come in contact with the live—or ungrounded—side of the line. Should a person making such contact with the live side of the line also make contact with the building ground, he will receive an electric shock. If, then, defective electrical equipment is present in the operating room, intercoupling inevitably increases the opportunities for such undesirable simultaneous contacts. The proper method of overcoming this difficulty is, of course, to make certain that the electrial equipment is installed in conformity with the regulations of the National Electrical Code, as laid down for hazardous locations. In view of the fact that such modification as this is likely to be both expensive and time-consuming, it is desirable to arrange the intercoupling in such a way as not to increase the hazard of electric shock. This has been done by a device known as the high resistance intercoupler.[1] This is a unit having several terminals the resistance between any two of which is approximately one megohm (1,000,000 ohms). This resistance between any given

pair of terminals is independent of any connection to other terminals. Although a resistance of one megohm is not as effective a bridge across any barrier insulator as a direct metallic connection would be, it is, nevertheless, sufficient to equalize potentials in a very short interval of time. Through it the potential difference between two persons standing on an insulating floor, for example, would be reduced, during an interval of approximately 1/1000 of a second, to 1 per cent of the value at the beginning of the interval. On the other hand, a resistance of one megohm limits any current which may flow through it from a 110-volt lighting circuit to a small fraction of any possibly dangerous value. In other words, at the cost of a slight delay in equalizing electrostatic potentials, it is possible to use intercoupling without increasing the electrical shock hazard. It must be emphasized that high resistance intercoupling offers no protection against electric shocks. It merely introduces no hazard of shock not already present.

High resistance intercoupling of the type just described has been used in an increasing number of operating rooms during the past two years. It is gratifying to report that during the last winter season, out of some twenty reported explosions, only one has occurred where an intercoupler was in use. In this case an electrostatic discharge of the type against which intercoupling is known to offor no protection is believed to have been the cause of ignition.

Intercoupling is unquestionably a valuable safeguard against anesthetic explosions. It accomplishes the desired objective, however, by counteracting the effect of insulating bodies rather than by eliminating the effect. Clearly the complete elimination of the effect is to be preferred. Let us, therefore, examine some of the more important insulators to be found in operating rooms with a view toward determining what steps can be taken toward their elimination.

In many operating rooms the most troublesome insulator is undoubtedly the floor. Inasmuch as the floor constitutes, in many cases, the only mechanical contact between conductive bodies, it follows at once that it is also the only available electrical path. If, then, it is not of conductive material, the result is that there is no electrical path for the equalization of charge. Floors of sheet rubber, of rubber tile, or of linoleum are very effective insulators. A number of fatal explosions can be traced directly to their presence. Floorings of tile or terrazzo constitute less effective electrical barriers than do rubber or linoleum. They are, however, less effective conductors than could be desired. Porous tile, when wet, may have reasonably high conductivity. On the other hand, the degree of moisture which may be present in such a floor is likely to be a matter of accident. Measurements have shown that the resistance between two people standing upon a terrazzo floor may be of the order of 100 megohms. If the floor has recently been washed, or if it has been washed repeatedly with a solution of calcium chloride so that it retains a considerable amount of moisture, this resistance may drop to somewhere in the vicinity of one megohm. Under certain conditions, therefore, it may be said that tile and terrazzo floors introduce no hazard of electrostatic discharge. The difficulty is that it is not always possible to determine whether this acceptable condition actually exists.

Many hospitals have been constructed in which metallic grids are incorporated in terrazzo flooring. The purpose of these grids is to increase

the electrical conductivity. Actual measurements have demonstrated, however, that unless contact is made directly to the brass grid there is little reduction in the resistance between two objects on the floor or between a single object and the building ground.

In an endeavor to obtain a solution to this problem, as well as to a number of others, attention has recently been given to the development of conductive rubber. Several manufacturers are now in a position to supply rubber having considerable conductivity. Although such material does not in any way compare with the metals in conductivity, it is still so good that it may properly be classed as a conductor. One manufacturer, the Boston Woven Hose and Rubber Company, in cooperation with the Anesthesia Committee of the Massachusetts Institute of Technology, has developed a type of flooring which is especially satisfactory for use in operating rooms. The rubber of which it is made has the highest conductivity — lowest resistivity — of any which has so far been examined. In addition there is incorporated in the finished sheet material a highly conductive metal screen. This is to insure that there shall be low resistance between any two bodies supported by the floor independent of the length of flooring separating them. As a result the resistance between any two points on the surface, as measured between metal electrodes 2 inches in diameter, is under 100 ohms. The resistance between any two objects chosen at random, however, is likely to vary considerably from this value. The actual resistance will depend upon the area in contact with the flooring, on the material making contact, and on the pressure.

Careful tests have shown that no charge can be retained for a detectable time by any conductive body in contact with this flooring. It is believed that this type of floor has advantages, in connection with the hazard of explosive anesthetics, because it may be installed readily in existing buildings as well as in new construction. It is also believed to be satisfactory from other considerations pertinent to flooring. It is, for example, easily cleaned and, since it is nonporous, may be preferable, from the standpoint of antisepsis, to tile or other similar materials. Although the conductive rubber flooring is possibly more slippery when wet than either tile or terrazzo, it is less slippery than either linoleum or ordinary non-conductive rubber when wet or when treated with a wax finish.

In order for conductive flooring to be effective it is, of course, necessary that all bodies supported by it make electrical contact with it. This makes it necessary to examine the shoes worn by any person and the casters or feet of all portable equipment in the operating room.

Regardless of the type of flooring used shoes having soles of rubber or of composition constitute so great a hazard that they should never be permitted in an operating room unless some appliance is attached to annul their effect. Of all shoe soles in common use those of crepe rubber are unquestionably the most dangerous. The situation with respect to shoes having leather soles is by no means as clearly definable. Many measurements, made over a long period of time, have disclosed the fact that a high proportion of shoes introduced no hazard at the time they were examined. It has been found, however, that a given pair of shoes may vary greatly from day to day. A pair which is unsafe in the morning may be

entirely safe in the afternoon, provided the wearer has been out to luncheon during a shower. Throughout the winter, shoes are in such frequent contact with damp ground that they generally retain sufficient moisture to make them adequately conductive. In the summer months, however, they are likely to become so thoroughly dried out that this protection no longer exists.

The ideal solution is to have shoes made with soles of conductive rubber. At the moment this is technically possible and such shoes have been made for experimental purposes. There is, however, some difficulty in the manufacture and distribution of these shoes for general use. It is hoped that they will shortly be available.

As a stop gap a conductive path between the body and the floor may be obtained by any of several attachments which may be applied easily to the shoe. These attachments involve some form of clip associated with a metallic plate inside the shoe for making contact with the foot and with some element making contact with the floor. This latter may be a flexible spring, a metallic brush, or a miniature drag chain.

Inasmuch as it is impossible to lay down any reliable rule by which the effectiveness of a given pair of shoes may be appraised, it is desirable that some means be available for actually testing any pair to be worn in an operating room. Any instrument used for this purpose should be so simple in operation that it may be used by the operating room personnel for frequent checks of the shoes which they use from day to day and also by any occasional visitors who may enter the operating room for short intervals. One such instrument has been developed. It consists, in effect, of an ohmmeter supplied with power obtained directly from the lighting circuit. It may be placed in operation merely by closing a switch. This ohmmeter is connected to two rectangular pads of conductive rubber mounted on a mat of non-conductive rubber. If a person stands with one foot on each of the conductive pads, the needle of the instrument indicates the resistance which would appear between his body and the grounding connection of a conductive rubber floor. The instrument scale has been divided into three sectors. The resistance values covered by one range, colored green, are considered safe. Those covered by another range, colored red, are considered unsafe. Those covered by a third range, colored yellow, fall between these two classifications and may be considered as marginal values.

There is, of course, no rigorous basis for the specification of the boundaries of the above ranges. In the instrument described above, the division between safe and marginal values has been placed at 250,000 ohms. The division between marginal and unsafe values has been placed at one megohm. This choice involves a number of considerations and is believed to provide ample safety without being too drastic.

Rubber-tired casters and rubber-crutch tip feet obviously constitute effective barrier insulators. Here again the problem can be solved most satisfactorily by the use of conductive rubber. At the moment, however, details of manufacture and distribution prevent the widespread application of this remedy. Effective contact between operating room equipment provided with rubber casters or feet may be obtained by the use of drag chains. Although chains are the most suitable form of electrical conductor for this purpose, from mechanical considerations, they have the disadvan-

tage that they are by no means ideal from the standpoint of electrical conductivity. The large number of joints between links and the possibility of the accumulation of grease, oil or other dirt makes them subject to frequent electrical discontinuities. This may be overcome to some extent by using a bundle of three or four light chains in place of a single heavier chain. In selecting a chain for use as a drag care should be taken to make sure that it is of brass or of bronze rather than of steel or iron. This is to reduce the likelihood of sparks due to striking contact with any tile or similar material with which the chain may come in contact. It is also necessary to make sure that chains without protective coatings of lacquer are used.

Other insulators which are commonly found in operating rooms, and which introduce a very serious hazard, are operating table and stretcher pads and rubber covered pillows. These are customarily covered with some form of rubber sheeting. As a result a person resting on the usual operating table pad is effectively insulated from the table. Where intercoupling is used the pad, as a barrier insulator, is effectively bridged. If other intercoupling is not used there should be an electrical connection directly between the body of the patient and some metallic portion of the operating table. If the electrical equipment has been properly installed there is no necessity for high resistance in this connection. It may, therefore, be a lead of flexible wire having sufficient sturdiness to avoid damage. This may be connected to the patient by means of a flexible metallic bracelet.

Here again the ideal solution is to use conductive rubber for the coverings of pads and pillows. Such material has been developed and is already on the market.

The danger inherent in insulating pads and pillows can not be overemphasized. It can be shown by actual measurement that movement of the patient on the usual type of operating table pad may leave him charged to a potential of several thousand volts. Again, if a rubber-covered pillow is allowed to fall from a cotton casing onto an insulated table, the latter may thereby acquire a potential as high as 10,000 volts. Clearly, precautions are necessary against the development of voltages such as these in an operating room.

The platforms on which surgeons frequently stand during operations may, unless special precautions are taken, involve considerable risk. As ordinarily built, these platforms are covered with a matting of non-conductive rubber and are provided with crutch-tip feet. As a result they constitute effective barrier insulators. Their use, however, entails a considerable increase in the hazard above that normally associated with the simple insulating properties. The potential energy associated with a fixed charge of static electricity on the body of a person is greatly increased as that person steps from the floor onto a low platform. For this reason particular attention should be given to make sure that the "step-ups" do not constitute barrier insulators. This may be done by replacing the present non-conductive matting by one of conductive rubber and by using crutch tips of conductive rubber or by using drag chains.

Up to this point we have considered the possibility of electrostatic discharges which might take place between two conductive bodies. In this connection insulators play two rôles. In one they constitute barriers preventing the equalization of charge. In the other they act as potential

sources of charge. In general, spark discharges between insulators are of almost negligible magnitude because, due to the high resistance of the surface, charges cannot move with sufficient rapidity to maintain an intense spark. Any charged insulator, however, has the power to induce a corresponding charge upon some neighboring conductor. This may result in a type of discharge against which intercoupling offers no protection. If a charged insulator is brought close to some sharp point on a conducting body the charge induced on the latter may be sufficient to produce a spark discharge from the point to the generalized mass charge on the insulator. Grounding the sharp pointed conductor increases the intensity of this charge rather than preventing it. For this type of discharge, therefore, there is no remedy except the elimination of all insulators.

This particular difficulty focuses attention on the rubber parts of the anesthesia equipment, inasmuch as these are the insulators most likely to be involved in discharges of the type described. Fortunately the effectiveness of the breathing tubes, breathing bag and mask, as generators of static electricity, is greatly reduced during normal use of the apparatus by moisture condensed on their inner surfaces from expired air. This air is saturated with water vapor and has a high carbon dioxide content. Any moisture films resulting from it are of sufficient conductivity to virtually destroy their effectiveness as electrostatic generators. Prior to contact with respired air, however, these rubber parts may present a considerable hazard. Steps are being taken to manufacture these parts of conductive rubber. This is, of course, an ideal solution to the problem. There have also appeared conductive coatings, similar to lacquers, which may be applied to existing parts made of non-conductive rubber. Tests have shown that these coatings are reasonably effective.

Before leaving the general question of electrostatic hazards a warning should be given against removing the breathing bag from the anesthesia machine during use. This can be shown to result in situations of considerable risk. A detailed explanation of the phenomena is too lengthy to be included here. It is also appropriate at this time to repeat the conventional warning against the use of woolen blankets in the operating room. This warning should, in fact, be amplified to include a prohibition against the wearing of sharkskin uniforms. At the same time it should be noted that silk stockings, silk or rayon undergarments, and rubber gloves introduce little, if any, risk of electrostatic discharge.

Next to electrostatic discharges it is probable that sparks from the electric power circuits constitute one of the most frequently occurring causes of the ignition of inflammable gases. Risk from this source may, however, be reduced to a negligible amount by adhering to the regulations of the National Electrical Code. In general, there is almost universal compliance with this code, in this country, with respect to the installation of permanently located equipment such as wall outlets, switches and lamps. However, its specifications are too often neglected in connection with portable equipment. Particular attention is called to Chapter 5, Article 500 of the National Electrical Code. This article applies specifically to hazardous locations in Class I, Group C, of which are included operating rooms. The regulations of this code should be scrupulously followed, not only to avoid the

possibility of igniting inflammable gases, but also to reduce the risk of electric shock.

A less frequently occurring cause of ignition is spontaneous combustion. There is one situation, however, under which an explosion of anesthetic gas, due to spontaneous combustion, may have appalling results. If, because of faulty design or handling of the anesthesia equipment, oxidizing and reducing gases, such as ethylene and oxygen, are allowed to mix under pressure, spontaneous combustion is almost certain to result. For this reason it is desirable that anesthesia machines be equipped with a separate pressure reducing valve for each cylinder. Should combustion originate in the high pressure system, the entire contents of the supply tanks are involved and the resulting explosion is inevitably of terrific violence. In some machines check valves are used on the high pressure side of a reducing valve serving more than one cylinder. In such machines great care should be taken to make certain that oxidizing gases, such as oxygen and nitrous oxide, and reducing gases, such as ethylene or cyclopropane, are never connected to a common reducing valve.

Although the precautions outlined above will greatly reduce the likelihood of igniting inflammable anesthetics it would, of course, be desirable, if possible, to use mixtures which were non-combustible. Work directed toward this objective has been undertaken by a number of investigators. The Bureau of Mines, for example, has recently published a report on mixtures of cyclopropane, oxygen and helium.[2] This report points out that there is an appreciable range of mixtures which have desirable anesthetic properties and which, at the same time, are non-explosive. A report by Haas, Hibshman and Romberger presents similar information for mixtures of cyclopropane, oxygen and nitrogen.[3] This, likewise, shows an anesthetic region which is non-inflammable.

Work along the same line is in progress at the Massachusetts Institute of Technology. Data has been obtained showing that non-explosive mixtures suitable for anesthetic purposes may be obtained by combining cyclopropane, ethylene and oxygen. The use of these three gases permits considerable adjustment of the anesthetic strength of the final mixture without entering the explosive region. Studies have also been made of cyclopropane-ethylene-oxygen mixtures to which an inhibiting gas has been added. Data have been obtained for both helium and nitrogen. In each case the addition of the inhibiting gas markedly increases the anesthetic region which is non-explosive.

One disadvantage of any of the above non-explosive ansethetic mixtures is that, in general, they contain undesirably low concentrations of oxygen. In some cases it is necessary to drop to 12 per cent or 15 per cent oxygen in order to avoid combustible mixtures. This difficulty may be overcome to a large extent by the addition of hydrogen rather than of an inert gas such as nitrogen or helium.

It has been found that hydrogen is more effective than either of these inert gases in pushing back the boundaries of the explosive region. With mixtures containing approximately 10 per cent hydrogen it is possible to obtain an anesthetic mixture of almost any desired strength without reducing the oxygen concentration below 30 per cent. With mixtures of high anesthetic strength it is possible to have as much as 40 per cent oxygen.

Before wide use can be made of this

knowledge it is believed that instruments will be necessary for informing the anesthetist accurately as to the composition of the mixtures in the anesthesia machine. In all of the above cases the region which is both anesthetic and non-inflammable is so restricted that slight departures from the desired composition may have serious consequences. Although the mixtures in the anesthesia machine may be non-explosive, if of the correct composition, they all form explosive mixtures with the air. Should one of these non-explosive anesthetic mixtures escape from the closed rebreathing system, therefore, it might be ignited outside the apparatus. In all probability, however, combustion would not extend to the mixture inside the equipment and there is little likelihood that the patient would be injured.

As a final line of defense, work has been under way for some time on the development of a flame barrier for inclusion in the breathing tubes of the anesthesia equipment. The function of such a barrier is to quench any combustion which may start on the side of the system away from the patient. In addition, a satisfactory barrier must cause no hindrance to free respiration nor must it allow the passage of a pressure pulse of sufficient magnitude to injure the patient. It can be reported at this time that barriers have been constructed which are capable of extinguishing combustion in any mixture of cyclopropane and oxygen. However, work has not yet been carried to the point where the remaining two requirements have been satisfactorily met. This reference to the flame barrier is mainly in the nature of a progress report. It is included to indicate the possibility of obtaining protection in addition to that provided by the more usual precautions.

It must be confessed that there are a discouragingly large number of factors to be taken into account in reducing the hazard of explosive anesthetics. It must not be inferred from this, however, that the difficulties are insurmountable. In fact, once the underlying difficulties are understood, it becomes a simple matter to avoid most of the risks. The establishment and maintenance of techniques for preventing anesthetic explosions are immeasurably less arduous than those involved in providing protection againt infection.

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THE NURSE ANESTHETIST—PAST, PRESENT AND FUTURE

GUSTAF W. OLSON, F.A.C.H.A.

Administrator of The Queen's Hospital, Honolulu, Hawaii
Guest Speaker at the Annual Banquet of the American Association of Nurse Anesthetists, September 17, 1940

I greet you not as a stranger but as a friend from afar and with a cordiality of approach which I hope will not offend or seem intrusive, because it is sincere and founded upon respect and admiration born of close association with your profession over a long period of years, during which I have followed your steady, consistent advance with genuine enthusiasm, and have witnessed some of your struggles for recognition at close range and with a sympathetic interest which I have been eager to translate into action wherever I felt that I could be of any help.

Having thus stated how I feel about your profession and the organization here assembled in which its interests are centered—I need not tell you that it filled me with pride to receive the courteous letter from your gracious Executive Secretary inviting me to be your guest speaker at this festive gathering.

The profession of nurse anesthetist, as you all well know, was born in the year 1892, in that place of origin of so many useful innovations and prograssive developments in medicine and surgery: Rochester, Minnesota, and its progenitors were the able and enterprising young "country doctors" William J. and Charles H. Mayo, who had then begun to build upon the secure foundation of medical competency and public confidence laid by their illustrious father a structure of scientific surgical and medical achievement which under the name of The Mayo Clinic has won the respect and admiration of the entire world. The first nurse an-

esthetist was Miss Alice MacGaw, a graduate of the Woman's Hospital School of Nursing in Chicago. It is safe to assume that she was an excellent nurse and had special talent which fitted her for the exacting duties to which the Doctors Mayo assigned her as their anesthetist. We can safely assume also that these brilliant operators had tried painstakingly and patiently to develop satisfactory anesthetists from among the medical graduates who were serving as internes and assistants in Saint Mary's Hospital, before they decided to seek out a nurse who would have the fundamental requirements for the intricate and responsible work in which they would instruct her and which she was to perform under their guidance and supervision. Miss MacGaw served as anesthetist to the Doctors Mayo for a period of sixeen years, until 1908, when she became the wife of Dr. George Kessel, and twenty years later died at the age of 68.

The record of this first nurse anesthetist is one that your profession can well be proud of. It may be gleaned in part from an article written by herself and published in the journal "Surgery, Gynecology and Obstetrics" in December 1906 under the title "A Review of Over Fourteen Thousand Surgical Anesthesias." The Bulletin of your Association rendered a valuable service to all nurse anesthetists by republishing that article in its issue for May, 1939. It was a creditable beginning of the history of your young profession.

It was not long after the Mayos had inducted Nurse MacGaw into the rôle of anesthetist until other graduate nurses possessing similar talent were recruited and trained through short but intensive courses of instruction, observation and practice to meet the growing need of the Mayo organization and to fill the positions which were opening rapidly for nurse anesthetists in other hospitals in Minnesota and elsewhere. When I began my hospital career in Minneapolis in 1909 every hospital in that city offered a regular anesthesia service staffed with nurse anesthetists, and I believe that most if not all of them had obtained their training as apprentices under Miss MacGaw and her assistants at St. Mary's Hospital. These early nurse anesthetists were, in the first place, graduates of good nursing schools, and in the second place, nurses of a superior type from the standpoint of keenness of intellect, capacity for detail and exactitude, and of known dependability. Most of them, I believe, had done chiefly surgery or obstetrical delivery room duty following graduation. They were thus fitted both by talent and training to undertake the responsibilities and higher technical duties involved in the administration of anesthetics.

A fact which should never be lost sight of by doctors, lawmakers, the laity, or the nurses themselves is, that nurses were *drafted* to give anesthetics under the instruction and supervision of surgeons, after it had been found that medical graduates were often inept and lacking the deftness and tender touch which patients required for a successful anesthetic, or they were too much interested in the operator's procedure and therefore failed to give a satisfactory performance as anesthetists. Surgeons knew that nurses were trained to carry out doctors' orders promptly, accurately and faithfully. They observed at every operation how the competent surgical nurse anticipated every requirement to an even greater degree than the medical graduate assistant. They knew that they could depend upon the nurses in the wards to carry out the difficult as well as the simpler orders for the postoperative care of even their most serious cases. They had learned to cast worry aside when there

was a competent nurse at the bedside. It was only natural, then, that the surgeon should turn to the graduate nurse when he wanted a thoroughly trustworthy assistant to carry out his orders for the administration of surgical anesthesia—a procedure only in degree more difficult or more important than those he daily entrusted to the experienced nurses on the surgical wards.

The nurse anesthetists of the past have given a good account of themselves, and you can point with pride to the founders of your specialty. They have reflected credit upon the whole nursing profession. There was none of the faltering and fumbling in their start which has marked the beginning of other new professions. They "came to bat" with a background of scientific knowledge and practical training which was a guarantee of successful performance. Some of them have left outstanding records of service and many of them are still carrying on their splendid work—an inspiration to those who are following in their footsteps.

I wonder if any history has been written of the part nurse anesthetists played in the late World War? If so, I am sure it tells of many heroic deeds by women whose weapon was the ether can and who unceasingly and without thought of sparing themselves fought to allay pain and suffering while the slashed and torn bodies of the brave victims of front line combat were being repaired by the skilled hands of the surgeons. May I quote a paragraph on this point from a letter received very recently from one of the early nurse anesthetists, who worked under my superintendency in a Minneapolis hospital for about five years before our entry into World War No. 1. Incidentally, during those five years and two months (February 1913 to April 1918) she administered more than ten thousand surgical anesthesias without a fatality. Answering my inquiry concerning her war experience she writes:

> "I left for France in April 1918 and was assigned to Mobile Hospital Unit No. 1. Gave anesthetics from the first of June to November after the Armistice. How many anesthetics I gave during the World War I cannot determine, except that when the big drives were on, lasting from a week to ten days, I averaged twenty-five to thirty a day. The first three months I gave chloroform entirely, after which a ruling came that we were to use ether because there had been too many deaths from chloroform in inexperienced hands. Many a night I had to pour ether or chloroform on my finger to determine the amount I was giving, because we had no lights except the surgeon had a searchlight for his work, so the only sign I had to go by was respiration."

This interesting historical note was contained in a letter from Mrs. Sophie Jevne, Hollywood, California, who concludes her personal communication with this statement: "I have now passed my twenty-seventh year of giving anesthetics and, thank God, I have never had a fatality."

Regarding her training Mrs. Jevne says: "When chosen from among the graduates of the hospital to give anesthetics, I was under the supervision of a senior nurse anesthetist for three months, I believe, and had no other training with the exception that during my first year I made several trips to the Mayo Clinic and observed, and acquired what information I could."

I submit this perfect score of a pioneer in your profession as a fitting conclusion to my discussion of the nurse anesthetists of the past, many of whom like Mrs. Jevne are still carrying on with a progressiveness and

efficiency which entitles them to be counted among the

Nurse Anesthetists of the Present

The popular standard by which progress and success in any endeavor is measured today is expressed in figures. When figures show gains we are encouraged. We have a subconscious, not to say sublime faith, in the safety of numbers, particularly as applied to our own particular group. Applying this standard of measurement to your profession, you have every reason to feel encouraged by the progress made in the comparatively few years since your profession was instituted and particularly in the last nine years since the formation of your Association. From data furnished me by your Executive Secretary I find that at your first annual meeting, held in September 1933—two years after your organization—you had 388 members. At the present time I understand your membership numbers around 2200 and is constantly growing. Every state in the Union, the territories of Alaska and Hawaii, and the Dominion of Canada, are represented. This nation-wide distribution indicates that nurse anesthetists are recognized universally through North America. Your growth in the last five years has been steady and at a fairly uniform rate, which indicates a healthy growth. Your present membership is 150 per cent larger than it was in 1935. It will probably be about 100 per cent larger in 1945 than it is today. The standards of qualification for membership which you have set up, however, may preclude the admission of a large number who, while satisfactory anesthetists in their respective places, have not had the advantage of specialized training in acceptable courses of anesthesia. The new graduates of such courses who enter the profession each year should be counted upon to affiliate with your Association from the start. In fact, I think you have already won for your organization such respect from hospital administrators and medical staffs that no accredited hospital today will employ a nurse anesthetist who is not a member of the American Association of Nurse Anesthetists.

The character and extent of the specialized training which nurses aspiring to become anesthetists must go through has been vastly improved since the days of their honored forerunners in the profession, but the field from which they are recruited remains the same: they are first of all graduate nurses of the best type—intellectually keen, capable of absorbing the special instruction in physiology, physics, chemistry, pharmacology and mechanics which relate particularly to the science of anesthesia. They must have a practical mind which enables them to grasp the technique of applying this instruction in the administration of anesthesia, a procedure which calls for not only a large amount of technical knowledge but also a capacity for the exercise of judgment which basically is a natural endowment. The basis of selection which governed the choice of the first nurse anesthetist prevails: she must be a good nurse, one with something more than a good bedside manner, although that is not to be scoffed at but an asset of value to every nurse anesthetist.

The present-day nurse anesthetist, although she might well be considered entitled by the special character of her qualifications to set herself up as an independent professional, has wisely chosen to retain her status of graduate nurse in her relation to the medical profession. I wish to place special emphasis upon this point, because it disarms at once any objection to your professional activity which might be raised by the allegation that you are engaging in the practice of medicine.

As nurses you have been trained to serve the doctors and carry out their orders. As nurse anesthetists you bring to the aid of the operating surgeon your knowledge and experience in anesthesia and place these special qualifications at his disposal and under his orders and supervision.

Your status as graduate nurses and the maintenance of that relationship to the nurses' organizations and the medical profession is your best defense against the selfish, narrow contentions which arise from time to time among certain groups of doctors. Such contentions, as you are aware, have found expression is resolutions reaching even meetings of the American Medical Association, and some attempts have been made, I believe, to obtain court decisions or the enactment of laws declaring the administration of anesthesia by nurses unlawful. All such attempts have failed up to the present time, but I think you may look for them to be repeated in localities where an oversupply of doctors renders the economic situation precarious for some of them.

The mention of economics in relation to medical practice brings up a question the answer to which is all in your favor. Hospital administrators are daily face to face with this question as complaints reach them from patients who have difficulty in meeting their bills. They are constantly studying their costs and making intensive efforts to lower them or at least keep them from going up. They are doing this solely in the interest of the public, with an earnest determination to modify the cost of medical care insofar as the hospital has any responsibility for it. The nurse anesthetists have had a greater part in this modification of the cost of medical care than the public knows. The contributory hospital service plans which have spread with such astounding rapidity over our country and are operating with such uniform success, are furnishing a gratifying solution to some of the hospital administrator's problems in the matter of making hospital service available to the people at nominal cost. One factor which operates to make the service furnished by the hospitals under these plans more complete than it otherwise would be is the existence of nurse anesthetist staffs in the cooperating hospitals. The membership contract in nearly all contributory hospital service plans provides for the cost of anesthesia service when rendered by an anesthetist employed by the hospital, but it does not cover a physician's separate fee for anesthesia. The rôle thus played by the nurse anesthetist in making broad and inclusive the benefits of these popular, and from the social-economic viewpoint, important hospital service plans, is one which hospital administrators appreciate and are glad to bring to the attention of the public. Your position is made more secure by the inclusion of your services in these plans, which now reach millions of American individuals and families.

But I do not want to be understood as ruling out the doctor from the field of anesthesia. The ideal anesthesia service in any hospital, in my opinion, provides for a member of the attending medical staff as director or medical supervisor. In a hospital of moderate size such an official should function on a volunteer basis the same as the chiefs of other staff services. In hospitals having a large force of nurse anesthetists I believe that a full-time medical graduate who has chosen anesthesia as his medical specialty should be employed as chief of the staff of anesthetists. His qualifications as a specialist should be properly authenticated and he should be technically proficient in the operation and care of anesthesia equipment at least to the same degree as the nurse anesthetists

under his supervision. He should be paid an adequate salary and the fees for his services should be collected and retained by the hospital. There could be no profiteering by the hospital under such an arrangement because it is not likely that he would find time to give a sufficiently large number of anesthetics to pay his salary. His value to the hospital as a consultant, adviser and research scout on problems of anesthesia would warrant paying him well regardless of whether he earned any fees for the hospital or not.

Before ending my discussion of the present-day nurse anesthetist may I interpolate a few remarks which have nothing to do with your profession directly, but have everything to do with it indirectly and may be the deciding factor between success and failure, between happiness and drab existence. "Take your serious duties more pleasantly and your pleasures more seriously," is an old philosophy which I have found tremendously potent for the maintenance of courage and optimism, the lightening of the day's burdens and the brightening of the few hours allotted to us hospital workers for rest and relaxation. No eight-hour day applies to your activity or mine. We are engaged in a service which ignores the clock as it counts heartbeats and measures the ebb and flow of life. Our work becomes oppressive and we tire before we have half begun unless we can approach our daily tasks with a song in our heart, a smile on our lips and cheerfulness in every feature of our countenance. Such a spirit, such a frame of mind we can maintain only if we use our spare moments and our rare leaves from duty to pursue vigorously our hobbies or favorite pastime, and play, whatever it may be, so long as it is wholesome and diverts us from the things that would weigh us down. "Nothing really matters but living," says Willa Cather, "get all you can out of it. I am an old woman and I know. Accomplishments are ornaments of life, they come second." Take every opportunity to cultivate friendships and seek out good companions. Books can be such, but I fear that many professional women carry their devotion to books and the silent arts too far for their own good. We do not really live except as we associate with the living. Keep ever in mind that you are a graduate nurse, first, last, and all the time. Your R.N. is a Magna Charta which guarantees you your rights as a nurse anesthetist. You should take an interest in the affairs of nursing organizations for the good of the whole nursing profession, and of course you should be active in your own particular society group, local as well as national. Beyond this I would advise you to affiliate with your local business and professional women. You are eligible to join a service club of such women and I heartily recommend that you avail yourself of the opportunity to do so wherever it exists. Such organizations are mighty factors for self-improvement and community service.

We come now to the *Nurse Anesthetist of the Future.*

What will she be like? In papers and discussions at recent hospital conferences prognostications have been made with regard to the hospital of the future—some of them apparently serious, some hardly that. This is the picture I have pieced together of the future hospital: It will be a windowless building to exclude noise, dust, wind and glare. Air and atmosphere will be ideally conditioned by mechanical means. Concealed heatless lighting will be controllable to simulate dawn, midday, sunset and twilight. Concealed rollers will have wall-hangings of a great variety which will be drawn down to suit the patients' tastes and idiosyncrasies—landscapes, sea-

scapes, street scenes, home interiors, or plain pastel panels will be pulled down to please the eyes and senses of the sick and the convalescing. Beds will be individually air conditioned, warmed or cooled as the patient may desire or require. Sanitary arrangements will be automatic and positive, obviating any need for the present-day objectionable utensils. Linens will be replaced by a synthetic paper-like material softer and more absorbent than our present bed-sheets. This material will come from the mill on rollers which will be mounted below the spring bottom of the bed—a clean roll on one side, a roller taking up the soiled material on the other side. When the nurse wishes to give the patient a fresh, clean underlay she presses a button and the electrically operated sheet-changer brings the chrome-plated arms into action, gently lifting the patient while the satin-like synthetic sheet unwinds from the fresh roll and the used section is taken on by the soiled roll. There will be no laundering in the hospitals of the future because of the absence of old-fashioned linens, and there will be no dishwashing because all dishes will be of inexpensive light plastic which will be so low in cost that used pieces will be discarded and new sets issued at every meal. With all of this the cost of hospital care is going to be materially lowered, according to the prophets whose composite creation I have tried to visualize in the foregoing description.

Now let us turn our imagination loose and see if we can visualize the future nurse anesthetist. In the hospital I have described she will be seated in an elevated glass cubicle in the center of the circular rotunda around which the operating rooms radiate. Before her she will have a control table with some fifty or sixty indicator dials similar to the pilot's dash board in a giant super-stratosphere plane. Every type of anesthetic for every type of operation will be numbered and indexed, and before her she will have the day's schedule of cases with the number set down for each. As the patient is wheeled past her post of observation and control she notes the number on the patient's covering, like the digits on a football player's sweater, and makes the proper check on her chart. When the patient has been wheeled into the operating room she switches on her television for that room, and as soon as this indicates that the patient has been properly placed she presses the button which lowers the mask over the face of the patient and the anesthesia starts automatically and proceeds by mechanical means which have been developed to greater sensitivity than the human touch. Through her television she observes the patient and the surgeon, and from the multitude of dials before her she knows exactly what to do to keep the patient properly and safely under until the view shows that the job is finished. With six or seven operating rooms going all at the same time and the one anesthetist watching all the dials and television panels and operating the controls for all those cases simultaneously she has a fairly strenuous time, not unlike the pilot of the modern super-plane, and like him, she will probably have to be replaced at frequent intervals and sent to recuperate at an institution for the restoration of shattered nerves.

Has our imagination given us a true picture of the future nurse anesthetist? *Emphatically NO!* She will be as skilled, as kind, as tender in her handling of the patient; as observant, precise and dependable in her attention to the surgeon's orders and suggestions as her colleague of today—only perhaps more so, if that is possible. She will approach every new patient with a smile, a pleasant greeting, and reassuring words which will dispel fear

and instil confidence and faith and make of what to the sufferer on the operating table has seemed like a gruesome, painful ordeal a sweet dream of restored health, of new strength and vigor for active living—a dream which miraculously comes true.

So I come to the close of this incomplete and very imperfect discussion of the Nurse Anesthetist in the three stages of her existence indicated by my topic. To *Her* of the past, our grateful tribute; to you of the present, my appreciative recognition of your excellent performance of a vital service essential to the safe and economical conduct of the surgical services of our hospitals; to *Her* of the future, the greatest possible measure of success and happiness in carrying on and advancing the noble work so well begun and furthered by Her predecessors.

UNIVERSITY HOSPITALS SCHOOL OF ANESTHESIA ALUMNAE ASSOCIATION

Officers Elected at meeting in Boston, September 19, 1940

President	Clara Moore St. Alexis Hospital, Cleveland, Ohio
Vice-President	Lucy E. Richards City Hospital, Cleveland, Ohio
Secretary	Charlotte Duggar University Hospitals, Cleveland
Treasurer	Kay Sheehan St. Joseph's Mercy Hospital, Pontiac, Mich.
Trustee (one year)	Esther Pracejus Lutheran Hospital, Cleveland, Ohio

PRIZE OFFERED

See letter from Miss Hodgins contained in "DEPARTMENT OF EDUCATION," under "Instructors' Session," on page 305 this issue. Further details in regard to the contest will be published in the February issue.

DEPARTMENT OF EDUCATION

Instructors' Session

The well-attended Instructors' Session held during the Boston convention developed subjects of keen interest not only to the educators themselves, but to the general membership as well. Among the subjects discussed was a proposal that nurse anesthetists adopt an identifying insignia (such as a specially designed chevron for the uniform sleeve), as well as a standard tailored jacket to be worn routinely over the short sleeved clinical uniform when visiting patients in their rooms either pre-or postanesthesia. The suggestions possess much merit. More will be heard of them later.

An important proposal was presented for consideration by the session, that a Medical Advisory Committee be created, its membership to consist of surgeons now at the head of various representative surgical services. After discussion, the matter was presented to the Board of Trustees, and is now under active study.

A suggestion was presented that the membership at large might derive much of value from publication, in the Department of Education, of a symposium of articles describing clinical techniques of administration of specific anesthesias—the articles to be selected from a number to be written by member nurse anesthetists whose surgical services regularly require the administration of considerable numbers of those exact procedures. The Correlating Committee will be glad to hear from members who feel that such publication would serve a specifically helpful purpose.

The ever pregnant subject of individual and staff salaries was freely discussed, with a full and sympathetic understanding of the income problems which face hospitals generally. It was felt that these economic factors will in regular course adjust themselves equitably.

A question considered by the session concerned the inauguration of new training courses in anesthesia where the size or organizational set up of the institution might restrict either the teaching facilities or the amount and variety of clinical material available. The consensus was that while on the one hand the conduct of training courses in anesthesia should be definitely discountenanced in institutions housing limited clinical facilities or incompletely organized teaching courses, on the other hand, as a fulfillment of our responsibility and duty to the public, we should encourage the establishment of schools for training nurse anesthetists in those institutions where adequate teaching staffs can be maintained, complete teaching courses organized and the essential variety and amount of clinical material and surgical service made available for the proper teaching and training of qualified entrants to the field.

The Instructors' Session was eminently successful from the standpoint of number and significance of subjects introduced, the quality and thoroughness of the discussion entailed and the number and interest of members attending. It augurs well for the like session which has been planned for the convention at Atlantic City next year, under the Chairmanship of a member who will prepare a discussion program that will yield wide profit and interest to the large attendance which is expected.

Perhaps the highlight of the meeting at which it was read in Boston, was the following letter from Miss Hodgins:—

Doorway Cottage
Chatham, Mass.,
September 18, 1940

To the President of the American Association of Nurse Anesthetists.

Dear Miss Lamb:

I am always glad to follow a good example, and in this instance, I have in mind that set by one Miss Salomon, and the Pennsylvania State Association of Nurse Anesthetists, in making available prize awards for theses contributed by student anesthetists from schools in that state. This, to me, marked a milestone in the educational life of our organization.

As my interest in student education now extends to all schools of anesthesia for nurses, I am happy to ask you to announce a first prize award of $35.00, and a second prize award of $15.00, open to all students for theses or essays not to exceed five hundred words. The subject is to be selected from some phase or division of anesthesiology. The competition will be open between October 1st, 1940 and June 1st, 1941 inclusive. The National Educational Committee will be responsible for examining and judging the merits of the papers contributed. I am hopeful that this small beginning may prove to be the nucleus of a national competitive prize award open to students from all recognized schools of anesthesia and supported by contributions from all state associations of nurse anesthetists.

I feel, as I am sure we all do, that one of the most important duties of our national organization is to seek out and encourage the ambitious and gifted student to pursue special studies and give concrete expression to the knowledge gained. Only in this way can we be assured of continuous and progressive leadership in the future.

It is also a matter of satisfaction to me that my giving of this small gift should synchronize with the first meeting conducted by you as our newly elected president. I am deeply appreciative of the fact that in taking over the Educational Committee from me in 1933 you have consistently endeavored to bring to fulfillment the initial educational plans inaugurated by that committee. These plans, now in concrete form, will, we all hope, very soon be put into practical effectiveness in furthering the educational progress of the American Association of Nurse Anesthetists as related to the education of the student nurse anesthetist.

Faithfully yours,

(*signed*) Agatha Hodgins

It is from such constructive encouragement by our seasoned leaders, that new entrants to our field gain vision and inspiration.

HELEN LAMB, *Chairman*

STATE ASSOCIATION ACTIVITIES

CALIFORNIA

The California Association held its first fall meeting on Thursday, September 5, 1940, at the home of Mrs. Mabel Cauthorn, in San Mateo, with nineteen members present. The regular business meeting was preceded by a delightful barbecue supper given by Mrs. Cauthorn.

The November meeting will be held at St. Mary's Hospital in San Francisco, at which time Myra Quarles will present a report of the annual convention held in Boston in September.

COLORADO

The Colorado Association held its first fall meeting on October 2, 1940, in the Auditorium of Mercy Hospital, Denver. The meeting opened with a discussion of articles from current journals and an open forum on anesthesia problems. Plans were made for social programs during the year.

Dr. Menifee Howard gave an interesting talk on the silver fox industry, showing motion pictures he had taken. It was much enjoyed by the members and a number of guests from the staff of Mercy Hospital.

Officers 1940-1941:

President	Ethel F. Currie Presbyterian Hospital, Denver
Vice-President	Elizabeth Hansbrough Fitzsimons General Hospital, Denver
Secretary-Treasurer	Maxine M. Leonard Mercy Hospital, Denver
Trustees	Mae Morcom Carpenter Louise Bowden Allen Ann M. Stevens
Committees	
Membership	Ethel F. Currie Margaret L. Kramer Louise Bowden Allen
Revisions	Mae Morcom Carpenter Ann M. Stevens Louise Bowden Allen
Program	Linda M. Stuart Elizabeth Hansbrough Henrietta M. Moon

MID-SOUTH AND TENNESSEE MEETINGS

The seventh annual convention of the Mid-South Post Graduate Nurse Anesthetists' Assembly and the annual meeting of the Tennessee Association of Nurse Anesthetists, will be held at the Hotel Peabody, Memphis, Tenn. February 12 and 13, 1941, in conjunction with the Mid-South Post Graduate Medical Assembly.

For further information write Miss Zelda C. Holland, Secretary of the Mid-South Post Graduate Nurse Anesthetists' Assembly, St. Joseph's Hospital, Memphis, Tenn.; or Miss Jewelle C. Fink, Secretary of the Tennessee Association of Nurse Anesthetists, Physician & Surgeons Building, Memphis, Tenn.

MASSACHUSETTS GROUP ORGANIZES

An organization meeting of the Massachusetts Association of Nurse Anesthetists, was held on May 22, 1940, at the Massachusetts General Hospital, Boston, with twenty-seven members present.

The meeting was called to order by Miss Gertrude Gerrard. Miss Agatha Hodgins was the guest speaker and gave a talk on the organization of state associations.

The following officers and Board of Trustees were elected:

President	Elizabeth Farrell, Massachusetts General Hospital, Boston
1st Vice-President	Marion Smith, Newton Hospital, Newton Lower Falls
2nd Vice-President	Elizabeth MacRae, Peter Bent Brigham Hospital, Boston
Secretary-Treasurer	Betty Lank, Children's Hospital, Boston
Trustees:	Elizabeth Farrell Gertrude Gerrard Betty Lank Jessie Bliss

MICHIGAN

The Michigan Association of Nurse Anesthetists will hold its third anniversary meeting in the English Room, Hotel Statler, Detroit, on November 9, 1940. The program is as follows:

8:00 P. M. Report of the annual meeting of the American Association of Nurse Anesthetists held in Boston

"Visits to European Clinics Just before the War"
Henry Harkins, M.D., Associate Surgeon,
Henry Ford Hospital, Detroit

"Health Service Plans"
Mr. John R. Mannix, Detroit,
Director, Michigan Society for Group Hospitalization.

Suggestions in regard to problems which the members would like to have dicussed at future meetings may be placed in the question box at the door.

A number of the members are planning to have supper together before the meeting, in the Café Rouge, Hotel Statler, at 6:00 p.m. All are welcome to join this informal gathering.

MISSOURI

Officers

President	Regina Noon 4954 W. Pine Blvd., St. Louis
Second Vice-President	Ineze Breitweiser Grand Blvd. and Shaw, St. Louis
Secretary	Ann L. Gettinger 1621 Grattan, St. Louis
Treasurer	Alice H. Gronewald 416 South Kingshighway, St. Louis
Trustees 3-year	Jessie Lindsey Anna Cox Sister Theresa Kettelhut

NEBRASKA

The annual meeting of the Nebraska Association of Nurse Anesthetists was held in Lincoln on October 9, 1940. A report of the annual convention of the American Association of Nurse Anesthetists held in Boston, was given by the delegates, followed by a round table discussion on anesthesia. Refreshments were served

Officers Elected:

President	Wilhelmina Gulotta 1734 South 17th Street, Lincoln
Vice-President	Ruby Christensen Bryan Memorial Hospital, Lincoln
Secretary-Treasurer (re-elected)	Leona Nelson Walnut, Nebr.

OKLAHOMA

The semi-annual dinner of the Oklahoma Association of Nurse Anesthetists was held at the Skirvin Hotel, Oklahoma City, August 29, 1940. The business meeting was held at the Wesley Hospital Nurses' Home, at which a report of the meeting of the Mid-West Hospital Assembly held April 16, 1940 at Kansas City was given by Dixie Lee Diefenderfer and Julia D. Loftus.

Dixie Lee Diefenderfer, Wesley Hospital, Oklahoma City, former First Vice-President, will replace Miss Martha Puett as President, following Miss Puett's departure from the state.

OREGON

The Oregon Association reports that an interesting program of lectures to be given at the monthly meetings, has been planned for the coming year.

TEXAS

The sixth annual meeting of the Texas Association of Nurse Anesthetists will be held on February 27 and 28, 1941, in Dallas, Texas, in conjunction with the Texas Hospital Association.

For further particulars write Mrs. Jack K. Childress, Secretary-Treasurer of the Texas Association of Nurse Anesthetists, 716 West Avenue G, Temple, Texas.

COMING MEETINGS

Florida	Annual meeting, November 2, 1940 Miami
Michigan	Third anniversary meeting, November 9, 1940, Detroit
Texas	Annual meeting February 27-28, 1941 Dallas
Tennessee Association and Mid-South Post Graduate Nurse Anesthetists' Assembly	Annual convention February 12-13, 1941 Memphis, Tenn.

PRIZE OFFERED TO STUDENTS IN UNIVERSITY HOSPITALS OF CLEVELAND SCHOOL OF ANESTHESIA

A prize of $10.00 has been offered as a yearly award, by the Alumnae Association, for a paper on any subject pertaining to anesthesia. The papers will be judged by a committee of three: Miss Agatha C. Hodgins, Miss Miriam G. Shupp and Mrs. Myra Van Arsdale.

FORM OF BEQUEST OR CONTRIBUTION

In response to inquiries reaching the headquarters of the American Association of Nurse Anesthetists the following form is suggested as a proper one to follow:

"I give, devise and bequeath to the American Association of Nurse Anesthetists' Trust Fund the sum of.....
.....dollars, or property or holdings as follows:

All income from the Fund known as the American Association of Nurse Anesthetists' Trust Fund will be used for the aged and indigent nurse anesthetists who qualify for participation in the benefits of said fund as stated in Trust Fund Document.

Signed .....
(Address in full) .....
Date..... .....

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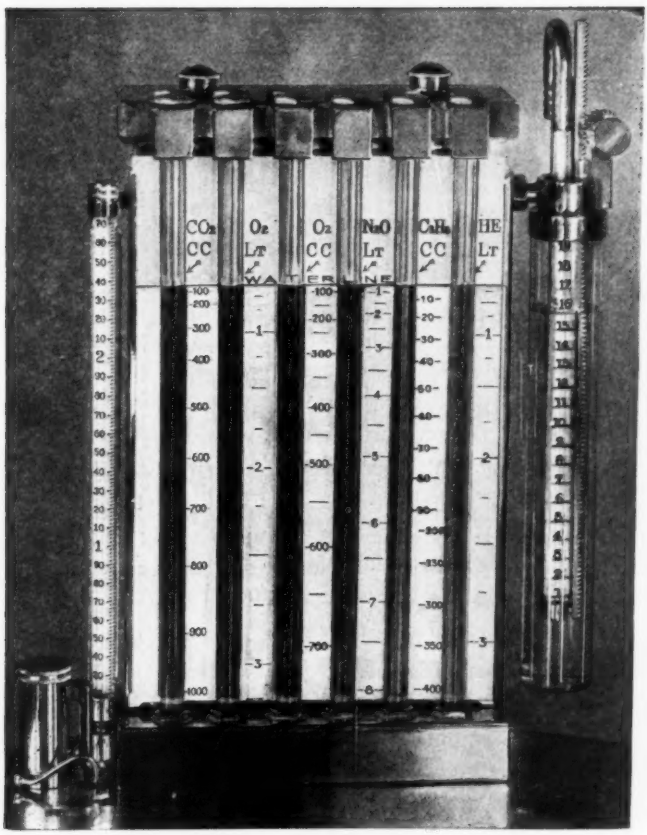

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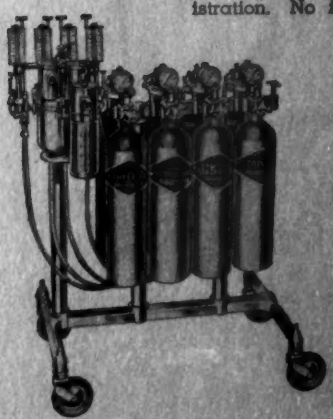

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